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QUARTERLY CUMULATIVE INDEX

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Abstracts 3680 - 5259

Vol. 7 No. 18B

Technical Information Service, Oak Ridge, Tennessee

GUIDE TO ABSTRACT WRITING

1. *Purpose.* It is very important that a paper be accompanied by an abstract, preferably appearing at the beginning. This abstract is not part of the paper — it is an adjunct intended to convey briefly the content of the paper, to draw attention to all new information and to the main conclusions. It should be directly informative, not merely indicative.

2. *Style of Writing.* The abstract should be written concisely and in normal rather than abbreviated English. Where possible, standard terms should be used and unnecessary contracting should be avoided. The third person is preferable. Mixed tenses, and both indicative and imperative forms should be avoided.

It should be presumed that the reader has some knowledge of the subject, but has not read the paper. He may not even have the paper available at all, if he is working with the abstract journal only. The abstract should, therefore, be intelligible in itself, without reference to the paper; for example, it should not cite sections or illustrations as a substitute for a statement of their content.

3. *Content.* The title of the paper is usually read as part of the abstract, therefore repetition of the title in the opening sentence of the abstract should be avoided. If the title is insufficiently comprehensive to indicate the subjects covered or the objects of the investigation, the opening sentence should make this clear.

The abstract should state newly observed facts, conclusions of an experiment or argument and, if possible, the essential parts of any new theory, treatment, apparatus, technique, etc.

It should contain the names of any new compound, and any new numerical data, such as physical constants; if this is not possible it should draw attention to them. It is important to refer to new items and observations, even though they may be incidental to the main purpose of the paper.

When giving experimental results, the abstract should indicate the methods used; for new methods, the basic principle, range of operation, and degree of accuracy should be given.

4. *Detail of Layout.* It is impossible to recommend a standard length for an abstract. It should, however, be concise and should not normally exceed 200 words. References should be omitted from the abstract whenever possible.

INTRODUCTION TO

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A Publication of the United States Atomic Energy Commission, Technical Information Service

The printing of this publication has been approved by
The Director of the Bureau of the Budget, August 2, 1951.

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Each issue of volume 7(1953) contains an author index to abstracts in that issue and a supplement to the Numerical Index of Reports. Subject and author indexes, as well as a cumulation of the Numerical Index of Reports, covering three-month periods are issued as supplements to the sixth twelfth, and eighteenth issues. The 24th issue will be the annual index for the year, superseding the three index supplements mentioned above.

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NUMERICAL INDEX OF REPORTS

Numerical Index of Official Atomic Energy Reports with Indications of Their Availability

This quarterly cumulation supplements the Numerical Index of Reports which appears in NSA, Vol. 6, No. 24A, and the two previous quarterly cumulations in Vol. 7, Nos. 6B and 12B. As reports are in manuscript form when abstracted for NSA, there may be some delay before the reports will be available at the Depository Libraries. The notation NSA in the Availability column indicates the appearance of a report in its entirety in NSA. In general, this list refers only to those reports abstracted in issues preceding the current one. Orders for items for which prices are indicated should be directed to:

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1353	7-2120	Phys. Rev. 90, 610-14(1953)
1354	7-2121	Phys. Rev. 91, 53-7(1953)
1355	7-2387	Phys. Rev. 90, 1013-18(1953)
1356	7-2643	Phys. Rev. 90, 587-602(1953)
1359	7-4455	Nucleonics 11, No. 6, 46-8(1953)
1362	7-3511	Phys. Rev. 90, 868-9(1953)
1366	7-4076	J. Chem. Phys. 21, 943(1953)
1377	7-3923	Phys. Rev. 90, 497-8(1953)
1384	7-3826	Phys. Rev. 90, 324-5(1953)
1393	7-4275	Phys. Rev. 91, 78-81(1953)
1430	7-4665	Phys. Rev. 90, 1126-7(1953)
CEA		
9	2-628	Compt. rend. 227, 829-31(1948)
10	2-217	J. phys. radium 9, 256-8(1948)
13	3-433	Compt. rend. 228, 480-1(1949)
14	3-1543	Compt. rend. 228, 1224-6(1949)
15	3-140 plus 4-236	J. phys. radium 10, 14D-16D, 17D-27D (1949)
16	2-831	J. phys. radium 9, 143-6(1948)
20	3-2184	J. phys. radium 9, 249-52(1948)
37	4-294	Compt. rend. 229, 356-8(1949)
38	4-128	Bull. soc. chim. France (5) 16, D265-71 (1949)
40	3-2057	Compt. rend. 229, 447-9(1949)
41	4-2317	J. phys. radium 11, 20(1950)
43	5-2199	Compt. rend. 230, 79-81(1950)
44	4-5025	Helv. Phys. Acta 23, 70-3(1950)

Report	Abstract	Availability
CEA	NSA	
45	4-4694	Compt. rend. 230, 638-40(1950)
48	4-4373	Compt. rend. 230, 1666-7(1950)
49	4-4578	Compt. rend. 230, 1864-5(1950)
50	4-5167	Helv. Physiol. et Pharmacol. Acta 8, 52-73(1950)
53	4-5264	J. phys. radium 11, 271-2(1950)
54	4-6070	Helv. Physiol. et Pharmacol. Acta 8, 146-68(1950)
55	5-2235	Compt. rend. 231, 345-7(1950)
57	5-2123	J. chim. phys. 47, Nos. 7-8(1950)
59	5-188	J. phys. radium 11, 501-6(1950)
61	5-3022	Industrie natl., No. 2, 51-60(1950)
63	5-1317	J. phys. radium 11, 1E-2E(1950)
75	5-5571	J. chim. phys. 48, 55-8(1951)
76	5-6200	Bull. soc. chim. France (5) 18, 139(1951)
77	5-6218	Bull. soc. chim. France (5) 18, 140-2 (1951)
81	5-6481	Compt. rend. 232, 2089-91(1951)
82	5-6912	Compt. rend. 232, 2091-3(1951)
83	5-6911	Compt. rend. 232, 2093-5(1951)
85	5-6848	J. phys. radium 12, 569-70(1951)
89	5-6428	J. phys. radium 12, 584-9(1951)
90	5-6429	J. phys. radium 12, 573-9(1951)
92	5-6314	Compt. rend. 233, 426-8(1951)
94	5-6843	J. phys. radium 12, 697-9(1951)
97	5-6180	Bull. soc. chim. France (5) 18, 580-3 (1951)
98	5-6430	J. phys. radium 12, 751-5(1951)
100	6-291	J. chim. phys. 48, 333-5(1951)
101	6-635	Compt. rend. 233, 785-7(1951)
102	6-1622	Compt. rend. soc. biol. 145, 677-80(1951)
103	6-1847	Physica 17, 209-12(1951)
104	6-696	J. phys. radium 12, 17A-25A(1951)
105	6-666	J. phys. radium 12, 32A-6A(1951)
106	6-1787	J. phys. radium 12, 37A-40A(1951)
107	6-634	J. phys. radium 12, 53A-64A(1951)
108	6-587	J. phys. radium 12, 64A-5A(1951)
109	6-1725	J. phys. radium 12, 66A(1951)
110	6-632	J. phys. radium 12, 67A-74A(1951)
111	6-1789	J. phys. radium 12, 74A-8A(1951)
112	6-1786	J. phys. radium 12, 78A-80A(1951)
113	6-1788	J. phys. radium 12, 777-83(1951)
114	6-697	J. phys. radium 12, 784-8(1951)
115	6-1623	J. physiol. (Paris) 43, 263-79(1951)
117	6-636	Compt. rend. 233, 1092-4(1951)
118	6-1265	J. phys. radium 12, 854-9(1951)
119	6-845	J. chim. phys. 48, 412-14(1951)
121	6-1225	Compt. rend. 233, 1369-71(1951)
123	6-1300	J. phys. radium 12, 952-3(1951)
124	6-1345	J. phys. radium 12, 955-6(1951)
129	6-2078	Compt. rend. 234, 538-9(1952)
131	6-4873	Nuovo cimento (9) 9, 169-83(1952)
132	6-4860	J. chim. phys. 49, 60-3(1952)
134	6-4221	J. phys. radium 13, 10A-13A(1952)
139	6-4980	J. chim. phys. 49, 204-12(1952)
140	6-3773	Bull. soc. chim. France (5) 19, 351(1952)
142	6-3632	J. radiol. electrol. 33, 43-5(1952)
143	6-3966	Compt. rend. 234, 1974-6(1952)
147	6-4155	Compt. rend. 234, 1969-71(1952)
148	6-5077	Bull. soc. chim. France (5) 19, 466-7 (1952)
150	6-4922	J. phys. radium 13, 299-307(1952)
153	6-4956	Compt. rend. 234, 2355-7(1952)
154	6-4917	Compt. rend. 234, 2448-50(1952)
155	6-5706	Compt. rend. 235, 38-40(1952)
156	6-5885	Compt. rend. 235, 159-61(1952)
157	6-5319	Anal. Chim. Acta. 7, 37-41(1952)
COO		
103	7-3137	$0.20
CRR		
495	6-6596	1.00
ISC		
154	6-735	Iowa State Coll. J. Sci. 27, 129-30(1953)
183	6-2464	Iowa State Coll. J. Sci. 27, 231-2(1953)
227	7-687	Phys. Rev. 90, 581-4(1953)

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ISC	NSA	
252	7-1527	Phys. Rev. 90, 557-63(1953)
262	6-5758	Chem. Eng. Progr. 49, 243-52(1953)
270	7-789	J. Chem. Phys. 21, 986-92(1953)
272	6-6549	Acta Cryst. 6, 487-95(1953)
288	7-3755	$0.25
296	7-3007	Anal. Chem. 25, 992-4(1953)
306	7-3966	Phys. Rev. 91, 28-30(1953)
317	7-3793	Phys. Rev. 91, 8-9(1953)
326	7-3034	J. Am. Chem. Soc. 75, 2272-3(1953)
332	7-3040	J. Am. Chem. Soc. 75, 2529-30(1953)
K		
934	6-5731	Rev. Sci. Instr. 24, 431-2(1953)
968	7-533	J. Phys. Chem. 57, 600-4(1953)
KAPL		
832	7-1508	Nucleonics 11, No. 5, 38-41(1953)
LA		
1438	6-5345	J. Am. Chem. Soc. 75, 2222-7(1953).
LADC		
1356	7-3840	Phys. Rev. 90, 492-3(1953)
LT		
35	6-6679	$0.50
MR		
17	6-6596	$1.00
MTA		
13	7-3586	Phys. Rev. 91, 342-4(1953)
14	7-3074	$0.45
NAA-SR		
212	7-2395	Phys. Rev. 90, 1054-7(1953)
224	7-3008	Nucleonics 11, No. 7, 53-6(1953)
NP		
1884	5-967	Can. Chem. Process Inds. 35, 397-8, 400-6(1951)
3057	5-3695	J. Am. Chem. Soc. 73, 4727-9(1951)
3794	6-4120	Anal. Chem. 25, 541-9(1953)
3817	6-4019	J. Phys. Chem. 57, 149-52(1953)
3935	6-4642	Arkiv Fysik 6, 57-68(1953)
3999	6-5567	J. Am. Chem. Soc. 75, 2467-70(1953)
4105	6-6304	Can. J. Phys. 31, 613-28(1953)
4223	7-812	Rev. Sci. Instr. 24, 371-4(1953)
4361	7-1995	Welding J. 32, 283-s-91-s(1953)
4421	7-2586	Anal. Chem. 25, 718-21(1953)
4504	7-3117	Phys. Rev. 90, 716-17(1953)
4564	7-887	Nucleonics 10, No. 11, 72-4(1952)
NRC		
2611	6-5790	$0.20
NSF-tr-		
2	7-4695	$0.10
3	7-4599	0.10
4	7-4696	0.10
5	7-4697	0.10
9	7-4600	0.10
11	7-4646	0.10
NYO		
1577	6-6414	$0.55
3024	7-2922	Phys. Rev. 90, 606-8(1953)
3068	7-3010	Anal. Chem. 24, 1985(1952)
3071	6-3351	$0.60
3144	7-2551	0.60
3164	7-4041	NSA
3221	6-5913	Phys. Rev. 90, 853-7(1953)
3265	7-2589	Phys. Rev. 89, 977-81(1953)
NYO	NSA	
3369	6-1993	J. Am. Chem. Soc. 75, 2736-8(1953)
3370	6-1994	J. Am. Chem. Soc. 75, 2739-41(1953)
3378	6-5062	J. Chem. Education 30, 115(1953)
3380	6-5985	J. Am. Chem. Soc. 75, 626-8(1953)
3516	7-3000	J. Am. Chem. Soc. 75, 2768(1953)
3554	6-4753	Anal. Chem. 25, 784-7(1953)
3558	7-4043	J. Am. Chem. Soc. 75, 3165-8(1953)
3611	6-6541	Anal. Chem. 25, 764-7(1953)
3620	7-3893	Phys. Rev. 90, 495-6(1953)
3643	7-2552	$0.80
3654	7-3235	Phys. Rev. 90, 712-13(1953)
3673	7-4044	Mining Eng. 5, 418(1953)
3676	7-575	Eng. Mining J. 153, 95-9, 174, 176(1952)
3710	7-3173	NSA; Phys. Rev. 90, 724(1953)
3712	7-2377	Phys. Rev. 90, 959-67(1953)
3713	7-2087	Phys. Rev. 90, 951-9(1953)
3839	7-4494	Phys. Rev. 91, 194(1953)
3872	7-2762	J. Am. Chem. Soc. 75, 1769-70(1953)
3999	7-4503	Phys. Rev. 90, 1004-5(1953)
4517	7-3061	$0.45
4519	7-2738	0.25; Nucleonics 11, No. 7, 60(1953)
4521	7-2898	0.10
ORNL		
90	4-88	Anal. Chem. 21, 1239-41(1949)
884	5-1127	Proc. Phys. Soc. (London) 66A, 590-6 (1953)
914	6-4482	$0.25
1142	6-3875	0.35
1313	7-3041	0.35
1324	6-5231	0.20
1340	6-5660	0.20
1411	7-2239	0.80
1459	7-2422	2.25
1479	7-3159	0.35
1525	7-3501	0.10
1538	7-3720	0.20
ORO		
82	7-535	J. Chem. Phys. 21, 1060-69(1953)
85	7-1602	Phytopathology 43, 236-8(1953)
91	7-2943	$0.35
SO		
3252	7-2847	$0.25
SUI		
53-1	7-1701	Nuovo cimento (9) 10, 630-47(1953)
TID		
3010(Suppl. 1)	7-2819	$0.20
3036	7-3148	0.60
5118	7-4242	0.60
UCLA		
47	4-1825	J. Biol. Chem. 185, 519-24(1950)
218	6-5909	Nature 171, 487(1953)
223	6-5931	Proc. Soc. Exptl. Biol. Med. 82, 665-8 (1953)
227	6-6450	Rev. Sci. Instr. 24, 459-60(1953)
229	7-51	Arch. Ind. Hyg. and Occupational Med. 7, 217-20(1953)
235	7-1034	Arch. intern. pharmacodynamie 93, 341-53(1953)
236	7-737	J. Am. Pharm. Assoc. Sci. Ed. 42, 296-300(1953)
247	7-2489	$0.35
UCRL		
1635	6-2997	Nucleonics 10, No. 4, 14-17 and No. 5, 14-19(1952)
1753	7-2612	Rev. Sci. Instr. 24, 552-3(1953)
1809	6-4562	Rev. Sci. Instr. 24, 462-3(1953)
1863	7-1631	J. Am. Chem. Soc. 75, 2459-64(1953)
1898	6-6577	J. Am. Chem. Soc. 75, 1859-63(1953)
1930	6-6503	Rev. Sci. Instr. 24, 388-90(1953)
1996	7-978	Phys. Rev. 90, 633-43(1953)
1997	7-3817	$0.25

Report	Abstract	Availability
UCRL	NSA	
2036	7-2826	$0.20
2040	7-2764	0.25
2049	7-2843	0.20
2051	7-3495	0.20
2056	7-3304	0.90
2076	7-2364	0.10
2077	7-2340	Phys. Rev. 90, 682-9(1953)
2088	7-3160	$0.20
2091	7-2899	0.45
2098	7-2656	Phys. Rev. 90, 499-500(1953)
2116	7-3030	J. Am. Chem. Soc. 75, 1867-8(1953)
2117	7-3231	$0.20
2120	7-3837	Phys. Rev. 90, 723-4(1953)
2126	7-3285	$0.10
2154	7-3404	0.25
2170	7-3921	Phys. Rev. 90, 1129-30(1953)
2173	7-3261	Phys. Rev. 90, 1124-5(1953)
UR		
191	6-2823	Pediatrics 11, 294-303(1953)

Report	Abstract	Availability
UR	NSA	
205(p.60-71)	6-4700	Part in Biochim et Biophys. Acta 10, 349-54(1953)
213(p.55)	6-5541	Am. J. Physiol. 171, 762(1952)
214	6-5542	Arch. Biochem. and Biophys. 44, 18-29 (1953)
218	7-23	Am. J. Anat. 92, 391-431(1953)
219	7-24	Am. J. Anat. 92, 433-49(1953)
221	7-1047	J. Lab. Clin. Med. 41, 918-28(1953)
225	7-758	Arch. Ind. Hyg. and Occupational Med. 7, 319-25(1953)
237	7-2946	Am. J. Physiol. 173, 41-6(1953)
240	7-4002	J. Gerontol. 8, 146-9(1953)
243	7-3322	Proc. Soc. Exptl. Biol. Med. 82, 67-70 (1953)
USNRDL		
380	7-2961	Arch. Ind. Hyg. and Occupational Med. 7, 508-15(1953)
WASH		
129	7-2799	$1.15

NEW NUCLEAR DATA

The New Nuclear Data presented here has been prepared by the Nuclear Data Group which has been reorganized under the sponsorship of the National Research Council with the support and cooperation of the National Bureau of Standards. The literature coverage has been continuous with that of the past. New Nuclear Data lists will not appear in the fall numbers of NSA. However, in this period the group will be at work on current data for inclusion in a 1953 cumulation which will appear in Vol. 7, No. 24B.

Summary of New Nuclear Data on Half Lives, Radiations, Relative Isotopic Abundances, Nuclear Moments, Neutron Cross Sections, Reaction Energies, and Masses.

Prepared by National Research Council Nuclear Data Group with assistance of Readers.

National Research Council Group: K. Way, A. L. Hankins, R. W. King, C. L. McGinnis, and M. Wood.

Leaders of groups in other laboratories which are assisting with the abstracting: G. Scharff-Goldhaber, Brookhaven National Laboratory; J. M. Hollander, University of California; C. S. Wu, Columbia University; P. Axel, University of Illinois; A. C. G. Mitchell, L. M. Langer, University of Indiana; J. R. Stehn, Knolls Atomic Power Laboratory; H. Pomerance, Oak Ridge National Laboratory; E. O. Wiig, R. W. Fink, University of Rochester; W. E. Meyerhof, Stanford University; L. Slack, Naval Research Laboratory.

ABBREVIATIONS

a	absorption measurement
$a\beta\gamma$	absorption of β's in coincidence with γ's
ace^-	absorption of conversion electrons
a coin	measurement by placing absorbers between counters in coincidence
α	total γ-ray conversion coefficient, N_e/N_γ
$\alpha_K, \alpha_L, \ldots$	γ-ray conversion coefficient for electrons ejected from the K,L,... shell
b	coefficient in angular correlation function, $1 + b \cos^2 \theta$
B	band spectra method
$Be\gamma n$	measurement by detection of photoneutrons from Be
$\beta\gamma, \gamma\gamma$	$\beta\gamma$ or $\gamma\gamma$ coincidences
$\beta\gamma(\theta)$	angular correlation of β's and γ's in coincidence
Calc	calculated value from experimental work reported elsewhere
cc	cloud chamber
ce^-	conversion electrons
chem	chemical separation of product following reaction
Cpt	Compton electrons
d	(1) deuteron, (2) descendant of, (3) days, when used as superscript
$d,p(\theta)$	angular distribution of protons with respect to deuteron beam
$D\gamma n, D\gamma p$	measurement by detection of photoneutrons or photoprotons from deuterium
$\overline{E}$	average energy
E_0	resonance energy
$E_\beta, E_\gamma, \ldots$	energy of β ray, energy of γ ray, ...
E_{dis}	disintegration energy
EA	electrostatic analyzer
E1,E2,...	electric dipole, electric quadrupole
ϵ	electron capture
ϵ_K, ϵ_L	electron capture from K, L shell
f	fission, in abbreviations for methods of production or detection
F-K	Fermi-Kurie β energy distribution plot
$\gamma(\theta,T)$	numbers of γ's as function of angle and temperature
Γ	resonance half-width (the whole width at half-maximum)
g.s.	ground state
I	(1) spin in units of $h/2\pi$; (2) nuclear induction magnetic resonance method
ic	ionization chamber
J	quantum state of compound nucleus in a nuclear reaction. "I" is used to denote the spin of the target nucleus, final nucleus
K/L	α_K/α_L
l	angular momentum of particle absorbed into nucleus
M	molecular or atomic beam resonance method
M1,M2,...	magnetic dipole, magnetic quadrupole...
mb	millibarns
Mic	microwave method
mir	measurement by total reflection of neutron beam from mirror surface
ms	mass spectrometer
μ	(1) magnetic moment in units of nuclear magnetons, (2) micron, 10^{-4} cm

μs	microseconds
osc	pile oscillator method
p	(1) proton, (2) predecessor of
para	paramagnetic resonance method
pc	proportional counter
pe^-	photo electrons
ppl	photoplates or emulsions
q	electric quadrupole moment in units of barns
Q	reaction energy in Mev
s	(1) spectrometer method, (2) seconds, when used as superscript
S	atomic-spectra measurement
scin	scintillation counter
sl	lens spectrometer
sl;ce^-	conversion electrons measured in lens spectrometer
st	strong
$s\pi$	180° spectrometer
$s\pi\sqrt{2}$	double focusing spectrometer
σ	cross section in barns
σ_0	cross section at resonance energy, E_0
σ_a	absorption cross section
σ_{el}	elastic scattering cross section
σ_{in}	inelastic scattering cross section
σ_s	scattering cross section
σ_t	total cross section
t	triton, H^3
τ	half life in units indicated
τ_1,τ_2	half life of upper, lower state
th	thermal
w,vw	weak, very weak
(0.123)	β and γ energy values enclosed in parentheses are given for identification purposes
%	% of disintegrations
†	relative numbers. When used in connection with γ rays, relative numbers of photons, not photons plus conversion electrons, are meant
+,−	even, odd parity

Standard journal abbreviations are used.
All energies are given in Mev and all cross sections in barns unless otherwise stated in the tabular material.

MAGNETIC MOMENT STANDARDS

In order to have a consistent basis for recording data on magnetic moments, results have been based on the following values and are without diamagnetic corrections.

$\mu(H^1)$ = 2.7934 nuclear magnetons
This value has been adopted arbitrarily because it is the one used as a base in the Table of H. L. Poss, The Properties of Atomic Nuclei, I. Spins, Magnetic Moments and Electric Quadrupole Moments. (Revised, BNL-26 (T-10), (unclassified).) The values reported in the New Nuclear Data summaries are thus directly comparable with those listed in the survey of Poss.

$\nu(Na^{23})/\nu(H^1) = 0.26450$ E. Bleuler, M. Gabriel, Helv. Phys. Acta 20, 67(1947).

$\nu(D)/\nu(H^1) = 0.153506$ F. Bloch, E. C. Levinthal, M. E. Pachard, Phys. Rev. 72, 1125(1947).

$\nu(B^{11})/\nu(H^1) = 0.320827$ D. A. Anderson, Phys. Rev. 76, 434(1949).

NEW NUCLEAR DATA

H^2
1 1

μ 0.857608 I
$\mu(D)\ /(H^1)$=0.307012192±0.000000015 H^1H^2
T.F.Wimett, Phys. Rev. 91,499A(1953).

Capture γ $H^1(n,\gamma)$ E_n= th scin
2.23
No lower energy γ's observed

A.Bracci, U.Facchini, A.Malvicini, Phys. Rev. 90, 162(1953); Nuovo Cim. 10,949(1953).

He^4
2 2

$H^3(d,n)$ E_d= 0.20 ppl
No level between 1 and 13 Mev $(\sigma/\sigma_{g.s}<0.015)$
L.Rosen, Nucleonics 11, No. 8,38(1953).

${}_2H_2^4$

$H^3(p,n)He^3$ E_p = 1 to 5

Broad max. at ~3 long counter
p,n(θ) indicates l_p=1 predominant
H.B.Willard, J.K.Bair, J.D.Kington, Phys. Rev. 90,865(1953).

$H^3(p,\gamma)$ E_p=1 to 5.2
No resonance for production of ~20-Mev γ's
Yield curve flattens at E_p~3.5 scin

H.B.Willard, J.K.Bair, J.D.Kington, Phys. Rev. 90, 865,(1953).

$He^5_{2\ 3}$ Levels $Li^7(d,\alpha)$ $E_d = 0.98$ ppl
g.s. $\Gamma = 0.3$
2.5 $\Gamma = 1.5$

P.Cüer, J.J.Jung, Compt. rend. 236,1252(1953).

$He^6_{2\ 4}$ $(\beta)(Li^6\ )(\theta)$, Li^6 time of flight spectra, suggest β-neutrino angular correlation of tensor interaction

J.S.Allen, W.K.Jentschke, Phys. Rev. 89,902A (1953).

$(\beta)(Li^6)(\theta)$ indicates tensor predominates over axial vector interaction $N\sigma\gamma(<3\%)$

B.M.Rustad, S.L.Ruby, Phys. Rev. 89,880(1953).

$Li^5_{3\ 2}$ Level $He^3(d,p)He^4$ E_d=0.26 to 3.6
16.80 $J = 3/2 +$ scin
σ_{max}= 0.90 for E_d= 0.43

J.L.Yarnell, R.H.Lovberg, W.R.Stratton, Phys. Rev. 90,292(1953).

$Li^6_{3\ 3}$ No reaction $Li^6(\gamma,d)\ He^4$ pc
σ<3.5 x 10^{-3} for E_γ= 2.62 enriched Li^6

P.Jensen, K.Gis, Z.Naturf. 8a, 137(1953).

$Li^7_{3\ 4}$ Level $Be^9(d,\alpha\gamma)$ E_d= 0.40 scin
$\alpha,\gamma(\theta)$ (0.478) I = 1/2

R.G.Uebergang, N.W.Tanner, Australian J. Sci. Res. 6A, 53(1953).

Resonances $Li^7(\gamma,t)He^4$ $E_\gamma \leqslant 15$ ppl
~5.25 σ=~0.02 mb
7.25 σ= 0.13 mb
~9.25 σ=~0.02 mb

P.Stoll, M. Wächter, Nuovo Cim. 10,347(1953).

$Li^6(n,t)He^4$ E_n=0.2 to 0.6
n,t(θ) shows l_n= 0 and 1 predominant ppl

L.E.Darlington, J.Haugsnes, H.M.Mann, J.H.Roberts Phys. Rev. 89,892A; 90,1049(1953).

$Li^8_{3\ 5}$ τ 0.89^s Li(0.53-Mev d)
$(12.5\beta)(1.5\alpha)(\theta)$ indicates I =?-,>0,0
No 4.9γ (<0.8% of Li^8 decays)

D.S.Bunbury, Phys. Rev. 90,1121(1953).

$Be^7_{4\ 3}$ $Li^7(p,n)Be^7$ EA
Threshold 1.8816±0.0010
$Li^7(p,n)$thresh/$Mg^{24}(p,p\gamma)$thresh=1.3737±0.0005

K.W.Jones, M.T.McEllistrem, R.A.Douglas, H.T. Richards, Phys. Rev. 91, 482A (1953).

τ (metal) 53.61^d Li(8.5-Mev p)
Counted for 5 months differential ic
τ dependent on chemical state

J.J.Kraushaar, E.D.Wilson, K.T.Bainbridge, Phys. Rev. 90, 610 (1953).

$Be^8_{4\ 4}$ τ $<5\times10^{-14}s$ O^{16} ($\lesssim$27-Mev γ)
From analysis of 38 4α-stars

C.H. Millar, A.G.W.Cameron, Can.J.Phys. 31, 723 (1953).

$_4Be^8_4$ Levels $B^{10}(\gamma,d)$ $B^{11}(\gamma,t)$
2.2 4.0 $E_\gamma \lesssim 31$ ppl
2.9 4.9
3.4 6.8
All α emitting levels

P.Erdös, P.Scherrer, P. Stoll, Helv. Phys. Acta 26, 207 (1953).

Levels $B^{11}(p,\alpha)$ E_p= 0.163
2.2 4.0 ppl, pc
2.9 4.9
3.4

H.Glättli, P.Stoll, Helv. Phys. Acta 26, 428 (1953).

Levels $B^{10}(d,\alpha)$ E_d= 1.0 s
2.87 Γ = 0.9
4.1?
~5.0
~7.5
9.6?
All α emitting levels $B^{10}(d,3\alpha)$ < 5%

P.Cüer, J.J.Jung, Compt. rend. 236, 2401 (1953).

Levels $C^{12}(\gamma,\alpha)$ $E_\gamma \gtrsim 26$ ppl
$\gamma\alpha(\theta)$ 2† g.s.
$\alpha\alpha(\theta)$ 10† (3-16)
12† 16.4?
56† 16.8 J=2+ Γ<0.3 T=1
20† 17.6 J=(2 or 4)+ Γ<0.3 T=1
γ/α<0.25 for 16.8 and 17.6 levels
Initial α's from > 25-Mev levels in C^{12}

J.J.Wilkins, F.K.Goward, Proc. Phys. Soc. 66A,661 (1953).

Levels
See C^{12}

D.L.Livesey, C.L.Smith, Proc. Phys. Soc. 66A,689 (1953).

$B^9_{5\ 4}$ Level $Be^9(p,n)$ E_p= 6.59 ppl
2.37

F.Ajzenberg, C.M.Braams, W.W.Buechner, Phys. Rev. 91,674; 91, 463A (1953).

$B^{10}_{5\ 5}$ q ±0.099 $B(CH_3)_3$quad res

H.G.Dehmelt, Z.Phys. 134,642(1953);133,528(1952).

Capture γ's $Be^9(p,\gamma)$ scin

7.48 level E_p = 0.998

28†	0.41	26†	1.4
228†	0.72		7.5
64†	1.02		

7.56 level E_p = 1.087

108†	0.71	17†	~2
<5†	1.4	98†	6.8

No 0.41γ (<0.8†) No 1.02γ (<5†) No 7.56γ

W.F.Hornyak, T.Cocr, Phys. Rev. 91,463A (1953); verbal report.

$B^{10}_{5\ 5}$

$\gamma\gamma$ $Be^9(d,n)$ scin
$(1.02\gamma)(0.72\gamma)$ $(1.43\gamma, 2.87\gamma)(0.72\gamma)$

S.M.Shafroth, S.S.Hanna, Phys. Rev. 91,483A(1953).

Levels $Be^9(d,n)$ E_d=0.60 ppl

130†	g.s.	200†	2.20
360†	0.73	60†	2.85
25†	1.75	170†	3.64

† rel σ at 90°

A.J.Dyer, J.R.Bird, Australian J. Phys. 6,45 (1953).

$B^{11}_{5\ 6}$

q +0.047 $B(CH_3)_3$ quad res

H.G.Dehmelt, Z.Phys. 134,642(1953); 133,528(1952).

Levels $C^{13}(d,\alpha\gamma)$ E_d = 1.8
γ's 4.50 pair s
4.96

R.P.Bent, T.W.Bonner, R.F.Sipple, Phys. Rev. 91, 472A(1953); verbal report.

Levels $B^{10}(d,p)$ E_d=4.25 to 8.52 sπ

7.99	9.19	
8.57	9.28	
8.93	10.32	double?

M.M.Elkind, A.Sperduto, Phys. Rev. 91,463A (1953); verbal report.

Levels Be(d,n) E_d = 0.96 ppl
d,n(θ) ~16.7 J = 3/2+
~16.7 J = 5/2−

J.S.Pruitt, S.S.Hanna, C.D.Swartz, Phys. Rev. 91 463A (1953).

$B^{12}_{5\ 7}$

Levels $B^{11}(d,p)$ E_d=4.25 to 8.52 sπ

0.95	2.72
1.67	3.38
2.62	

M.M.Elkind, A. Sperduto, Phys. Rev. 91,463A(1953); verbal report.

$C^{12}_{6\ 6}$

γ's $Be^9(\alpha,n\gamma)$
3† 3.16
100† (4.43)
No 7.6γ (< 0.04†)

L.E.Beghian, H.H.Halban, T.Husain, L.G.Sanders, Phys. Rev. 90,1129(1953).

Levels $C^{12}(\gamma,3\alpha)$ $E_\alpha \leq$ 70 ppl

40†	12.7	110†	19.5
35†	13.8	35†	20.7
115†	15.0	130†	21.9
110†	15.9	30†	23.2
125†	16.8	230†	24.3
190†	17.3	130†	25.4
330†	18.3	270†	26.5
130†	18.9	st	29.4

F.K.Goward, J.J.Wilkins, Proc. Roy. Soc. 217A (1953); Proc. Phys. Soc. 65A,671(1952).

$_6C^{12}_6$

$B^{11}(p,\gamma)C^{12}$ EA
Resonance 0.1638±0.0002 Γ = 0.0073
Level 16.099 absolute measurement

S.E.Hunt, W.M.Jones, Phys. Rev. 89,1283(1953).

Levels $B^{11}(p,\alpha)$ E_p=0.4 to 2.8 s

Yield†	Level	J	Γ
35.4/0.04	16.57	2−	0.25
8.8/1.0	17.22	2+	1.20
2.3/1.4	17.8	0+ ?	0.15
110.5/2.6	18.3		0.30

†Relative yield ($Be^8$3-Mev level)/(Be^8g.s.)α's

E.B.Paul, R.L.Clarke, Phys. Rev. 91,463A (1953).

Levels $B^{11}(p,\gamma)$ E_p=0.6 to 2.8 s
p,$\gamma(\theta)$ (16.57) J=2−
(17.22) J=(2+)
17.8 J=0+
18.3 J=2+

H.E.Gove, E.B.Paul, Phys. Rev. 91,463A(1953); verbal report.

$O^{16}(\gamma,4\alpha)$ $C^{12}(\gamma,3\alpha)$ $C^{12}(n,n'3\alpha)$
Levels in O^{16},C^{12},Be^8 connected by α emission ppl

O^{16}	C^{12}	Be^8	
20-24	9.6	g.s.	
20-24	11.3	g.s.	
20-24	12	~3	
——	15-19	~3	
——	>25	~17	
25	——	~4.3	$O^{16} \xrightarrow{16} 2Be^8$?
28-30	16	~3?	

$E_\gamma \leq$26 to 32

D.L.Livesey, C.L.Smith, Proc. Phys. Soc. 66A,689 (1953).

$O^{16}(\gamma,4\alpha)$ $E_\gamma \leq$ 48 ppl
Reaction proceeds 90% via 16-Mev C^{12} level for $E_\gamma >$ 25

C.A.Hsiao, V.L.Telegdi, Phys. Rev. 90,494;91,473A (1953).

$C^{12}(\gamma,\alpha)Be^8$ $E_\gamma \leq$27 ppl
σ(Be^8g.s.)/σ(Be^8~3-Mev level) = ~ 0.09

C.H.Millar, A.G.Cameron, Can. J. Phys. 31,723 (1953).

$C^{13}_{6\ 7}$

Levels $C^{12}(d,p)$ E_d=7.86 ppl
d,p(θ) g.s. l_n=1 σ = 0.09
(3.09) l_n=0 σ = 0.12

J. Catalá, F.Senent, J. Casanova, Anales real soc. españ. fís. y quím.49A,91(1953).

Capture γ $C^{12}(n,\gamma)$ pair s
4.949 ± 0.006

B.B.Kinsey, G.A.Bartholomew, Can. J. Phys. 31,537 (1953).

$_6C^{13}_7$

Levels $Be^9(\alpha,n\gamma)C^{12}$ $E_\alpha \leq 3.0$ scin

Level	E_o
11.98	1.90
w 12.50	2.65

F.L.Talbott, N.P.Heydenburg, Phys. Rev. 90,186 (1953).

C^{14} 6 8

F-K plot linear to 25 kev s

C.S.Wu, A.Schwarzschild, Phys. Rev. 91,483A(1953

$C^{13}(d,p)$ $E_d = 1.8$ pair s

No 4.1 pair emitting level found

R.D.Bent, T.W.Bonner, R.F.Sipple, Phys. Rev. 91, 472A (1953).

Levels $C^{13}(d,p)$ $E_d = 4.06$ ppl

d,p(θ) (6.1) $l_n = 0$

R.E.Benenson, Phys. Rev. 90,420 (1953).

N^{13} 7 6

$C^{12}(p,\gamma)N^{13}$ EA

Resonance 0.4568 ±0.0005 $\Gamma = 0.040$

Level 2.367 absolute measurement

S.E.Hunt, W.M.Jones, Phys. Rev. 89, 1283 (1953).

N^{14} 7 7

Levels $C^{13}(d,n)$ $E_d = 3.89$ ppl

d,n(θ)

Level	l_p
2.2	1
3.85	1
4.80	0
4.97	1?
5.5	0?
5.76	
6.1	
6.23	
6.43	
7.00	1?
7.50	0?
8.08	

R.E.Benenson, Phys. Rev. 90,420 (1953).

Capture γ's $C^{13}(p,\gamma)$ $E_p = 0.554$ scin

~25†	2.35	~18†	4.45
~10†	2.75	~ 4†	5.1
~15†	3.05	100†	(8.06)

D.Hicks, T.Husain, L.G.Sanders, L.E.Beghian, Phys. Rev. 90,163(1953).

γ's $C^{13}(d,n\gamma)$ $E_d = 1.8$ pair s

3.36	5.72
5.13	6.14?

R.D.Bent, T.W.Bonner, R.F.Sipple, Phys. Rev. 91, 472A (1953); verbal report.

Levels $N^{14}(\alpha,\alpha')$ $E_\alpha = 21.2$ a

4.10	7.03
5.22	7.95
5.72	8.64
6.01	9.23

2.31 level not observed (isotopic spin forbidden)

B.M.Carmichael, M.B.Sampson, O.E.Johnson, Phys. Rev. 91,473A(1953; verbal report.

$_7N^{14}_7$

Levels $C^{13}(p,n)N^{13}$ $E_p = 3.2$ to 5.0 pc

Levels	E_o	Γ
11.05	3.78	0.10
11.26	4.01	0.02
11.35	4.10	0.15
11.44	4.18	0.03
11.74	4.52	0.12
12.0	4.8	0.10

J.K.Bair, J.D.Kington, H.B.Willard, Phys. Rev. 90,575(1953).

Levels $B^{10}(\alpha,p\gamma)C^{13}$ $E_\alpha \leq 3.0$ scin

Level	E_o
12.68	1.50
12.77	1.63
12.81	1.68
12.92	1.83
13.17	2.16
~13.23	~2.27
~13.72	~2.95

F.L.Talbott, N.P.Heydenburg, Phys. Rev. 90,186 (1953).

N^{15} 7 8

Levels $N^{14}(d,p)$ $E_p = 5$ to 8 s

7.58	9.16	10.53
8.31	10.06	10.69
8.57	10.45	10.80
9.05		

A.Sperduto, W.W.Buechner, M.M.Elkind, W.J.Fader Phys. Rev. 473A (1953); verbal report.

Levels $C^{14}(p,n)$

p,n(θ) (11.294) J = 1/2(-?)

(11.429) J = 1/2+

(12.096) J = 5/2-

(12.147) J = 3/2-

(12.327) J = 5/2±

R.Kav, H.Mark, C.Goodman, Phys. Rev. 91,472A (1953); verbal report.

Levels N(n,n)N pc

n,n(θ) (12.327) $l_n = 1$

(12.494) $l_n = 2$

J.L.Fowler, C.H.Johnson, J.R.Risser, Phys. Rev. 91,441A(1943); verbal report.

N^{16} 7 9

No 1.0γ (<5% of 6.0γ) O(fast n) scin

F.Boehm, D.C.Peaslee, V.Perez-Mendez, Phys. Rev. 90,1119(1953).

O^{16} 8 8

γ's $F^{19}(p,\alpha\gamma)$ $E_p = 0.874$, 0.935 scin

(6.91γ)/(possible 0.78γ from 6.91 level)≥200

(7.12γ)/(possible 0.98γ from 7.12 level)≥120

(7.12γ)/(possible 1.06γ from 7.12 level)≥100

Results consistent with small T=1 admixture in levels involved (expected from Coulomb perturbation)

D.H.Wilkinson, G.A.Jones, Phil Mag. 44, 542(1953).

$_8O^{16}_8$

Level $F^{19}(p,\alpha\gamma)$ $E_p = 0.34$ $\alpha\gamma$
γ (6.13) $\tau \leq 10^{-9}$s

S. Gorodetzky, R. Armbruster, A. Gallmann, A. Knipper T. Muller, Compt. rend. 237, 45 (1953).

Levels $C^{12}(\alpha,\alpha)C^{12}$ E_α=0.5 to 4 pc
$\alpha,\alpha(\theta)$
9.58 J = 1- Γ = 0.860
9.84 J = 2+ Γ = 0.001

R.W.Hill, Phys. Rev. 90, 845 (1953).

Levels $N^{15}(p,\alpha)C^{12}$
$\sigma(E)$
12.43 J = 1-
13.09 J = 1-

W.A.Fowler, R.G.Thomas, Phys. Rev. 91, 473A (1953)

Reaction $O^{16}(\gamma,\alpha)C^{12}$ $E_\gamma \leq 27$ ppl
$\gamma\alpha(\theta)$ isotropic; ∴ excited states of C^{12} involved.
C.H.Millar, A.G.W.Cameron, Can. J. Phys. 31, 723 (1953).

See C^{12}
D.L.Livesey, C.L.Smith, Proc. Phys. Soc. 66A, 689 (1953); C.A.Hsiao, V.L.Telegdi, Phys. Rev. 90, 494; 91, 473A (1953).

F^{17} 9 8

Levels $O^{16}(p,p')$ E_p=0.28 to 4.6 pc
$p,p'(\theta)$
(3.11) J = 1/2-
(3.88) J = 7/2-?

F.J.Eppling, J.R.Cameron, R.H.Davis, A.S.Divatia A.I.Galonsky, E.Goldberg, R.W.Hill, Phys. Rev. 91, 438A (1953).

F^{18} 9 9

Levels $N(\alpha,\alpha')$ E_α= 1.5 to 3.4
6.7
6.8

N. P.Heydenburg, G.M.Temmer, Phys. Rev. 91, 439A (1953).

F^{19} 9 10

Levels $O^{18}(p,\alpha)N^{15}$ pc
$p,\alpha(\theta)$

Level	E_o	J
8.48	0.560	1/2 ∓ or 3/2 ∓
8.56	0.640	3/2 ∓
~8.6	~0.7*	1/2 ±
8.76	0.850	1/2 ±

*Broad background of one or more levels
A.V.Cohen, Phil. Mag. 44, 583 (1953).

F^{21} 9 12

τ 5s F^{19}(fast t)
E.C.Campbell, J.E.Strain, ORNL-1496 (1952)

Ne^{20} 10 10

Levels $O^{16}(\alpha,\alpha)O^{16}$ E_α=0.94 to 4.0 pc
$\alpha,\alpha(\theta)$

Level	J	Γ(kev)
6.74	0+	24
7.18	3-	10
7.22	0+	5

$_{10}Ne^{20}_{10}$

Level	J	Γ(kev)
7.45	2+	10
7.85	2+	3

J.R.Cameron, Phys. Rev. 90, 839; 89, 909A (1953).

$F^{19}(p,\gamma)Ne^{20}$ EA
Resonance 0.2244±0.0004 Γ = 0.001
Level 13.083 absolute measurement

S.E.Hunt, W.M.Jones, Phys. Rev. 89, 1283 (1953).

Na^{21} 11 10

τ 27s Na(≤70-Mevγ)
β^- 2.5 scin

F.I.Boley, Iowa State Coll. J. Sci. 27, 129 (1953)

Levels Ne(p,p') E_p=0.2 to 4.4 pc

4.20 5.04 5.58
4.31 5.50 6.48
4.48 5.83

W.Haeberli, A.Galonsky, E.Goldberg, R.Douglas, Phys. Rev. 91, 438A; 91, 439A (1953).

Na^{22} 11 11

β^+ 100† 0.540 s
0.06† 1.83 D_2 fits spectral shape

B.T.Wright, Phys. Rev. 90, 159 (1953).

Na^{23} 11 12

Levels Ne(p,p) E_p=2.4 to 3.6 pc

11.14 11.56
11.36 11.87
11.53

W.Haeberli, A.Galonsky, E.Goldberg, R.Douglas, Phys. Rev. 91, 438A; 91, 439A (1953).

Na^{24} 11 13

γ (1.38) $\tau < 2\times10^{-9}$s $\beta\gamma$
T.C.Engelder, Phys. Rev. 90, 259 (1953).

Capture γ $Na^{23}(n,\gamma)$ pair s
2.753±0.005

B.B.Kinsey, G.A.Bartholomew, Can. J. Phys. 31, 537 (1953).

Mg^{24} 12 12

Level Mg(n,n'γ) E_n= 14 scin
γ 1.44 n'γ

R.E.Garrett, F.L.Hereford, B.W.Sloope, Phys. Rev. 91, 441A (1953); verbal report.

Mg^{25} 12 13

Capture γ's Mg(n,γ) pair s
3.918
3.5† 6.358

Assignment by agreement with d,p results
† Photons per 100 n captures in Mg
Other lines not remeasured

B.B.Kinsey, G.A.Bartholomew, Can. J. Phys. 31, 901 (1953).

Mg^{26} 12 14

Levels $Na^{23}(\alpha,p\gamma)$ pγ scin

Level	γ's		
1.83	1.83		
2.97	1.14(6†)	(2.97)(1†)	1.83(6†)

$_{12}Mg^{26}_{14}$

Level	γ's		
3.97	2.14	(3.97) (vw)	1.83
4.35	1.38	1.14	1.83

Presence of 0.44 level in doubt

J.E.May, S.P.Foster, Phys. Rev. 90,243; 90,370A (1953).

Mg^{27} 12 15

Capture γ Mg(n,γ) pair s

13† 6.440

Assignment by agreement with d,p results
†Photons per 100 n captures in Mg^{26}
Other lines not remeasured

B.B.Kinsey, G.A.Bartholomew, Can. J. Phys. 31, 901 (1953).

Mg^{28} 12 16

β⁻ 0.40 Mg(39-Mev α) a
γ ~0.03 chem scin
30† 0.40
28† 0.95
71† 1.35

R.K.Sheline, N.R.Johnson, Phys. Rev. 90, 325, (1953).

τ 20.8^h Si,K(420-Mev p)
β⁻ 0.42 F-K plot linear chem; sl
No other β(≤10%)

L.Marquez, Phys. Rev. 90, 330 (1953).

τ 22.1^h Si(350-Mev p) a
β⁻ 0.3 p 2.3^m Al chem; scin
Several γ's up to 2.6 Mev scin

J.W.Jones, T.P.Kohman, Phys. Rev. 90, 495(1953).

τ 21.4^h Mg(56-Mev α)
β⁻ 0.39 a
γ 70† 0.032 α<1 scin
†Photons per 100 Mg^{28} decays

A.H.Wapstra, A.L.Veenendaal, Phys. Rev. 91, 426 (1953).

Al^{24} 13 11

τ 2.10^s Mg(20-Mev p)
γ 2.9 scin
4.3
5.3
7.1

N.W.Glass, L.K.Jensen, J.R.Richardson, Phys. Rev. 90, 320 (1953).

Al^{25} 13 12

Resonance Mg^{24}(p,γ)Al^{25} EA
0.4180±0.0005 Γ = 0.0040
absolute measurement

S.E.Hunt, W.M.Jones, Phys. Rev. 89,1283(1953).

Al^{27} 13 14

Q +0.149 I

H.Lew, G.Wessel, Phys. Rev. 90, 1 (1953).

$_{13}Al^{27}_{14}$

Levels Al(n,n'γ) E_n = 14 scin
γ 0.81? n'γ
1.03
2.34

R.E.Garrett, F.L.Hereford, B.W.Sloope, Phys. Rev. 91,441A (1953); verbal report.

Resonances Mg^{26}(p,γ)Al^{27*} EA

	E_o	Γ
	0.3148±0.0005	0.004
	0.3385±0.0005	0.002
	0.3894±0.0005	0.004
	0.4365±0.0004	0.004
	0.4542±0.0003	<0.001
(Al^{27}?)	0.484 ±0.0010	0.010

absolute measurement
*Assignment from Tangen who found no β⁺

S.E.Hunt, W.M.Jones, Phys. Rev. 89,1283(1953).

Al^{28} 13 15

τ 2.27^m ± 0.02 Al(pile n)
Counted 5 samples each for 5 half-lives

R.M.Bartholomew, F.Brown, W.D.Howell, W.R.J. Shorey, L.Yaffe, Can. J. Phys. 31,714(1953).

β⁻ 2.85 d 21^h Mg chem; sl
F-K plot linear

L.Marquez, Phys. Rev. 90,330 (1953).

γ 1.78 d 21^h Mg scin

R.K.Sheline, N.R.Johnson, Phys. Rev. 90,325(1953)

Si

Relative abundances SiF_4; ms

A	28	29	30
%	92.18	4.71	3.12

J.H.Reynolds, Phys. Rev. 90,1047 (1953).

Si^{27} 14 13

τ 4.45^s Si(≤25-Mev γ)

R.G.Summers-Gill, R.N.Haslam, L.Katz, Can. J.Phys. 31,70 (1953).

Si^{28} 14 14

Resonances Al^{27}(p,γ)Si^{28} EA

E_o	Γ
0.226±0.0015	~0.001
0.2941±0.0005	<0.001
0.3256±0.0004	<0.001
0.4047±0.0004	0.0007
0.4385±0.0005	<0.001
0.5040±0.0006	0.0007

absolute measurements

S.E.Hunt, W.M.Jones, Phys. Rev. 89,1283(1953).

Si^{29} 14 15

Levels Si(d,p) E_d = 8.21 a pc
d,p(θ)

Level	l_n	dσ/dΩ†
g.s	0	62
(1.278)	2	6.2
(2.027)	2	2.4
(2.426)	*	0.7

$_{14}Si^{29}_{15}$

Level	l_n	$d\sigma/d\Omega$†
(3.070)	2	1.2
(3.623)	3	4.0
(4.934)	1	55
(6.380)	1	32

†mb/sterad at maximum of angular distribution
*angular distribution isotropic

J.R.Holt, T.H.Marsham, Proc. Phys. Soc. 66A,467 (1953); Phys. Rev. 89,665(1953).

$Si^{29?}$ 14 15

Resonances Mg(α,n)Si E_α= 5.3 a
4.6
4.8

Excitation function given

J.Nagy, Acta Physica Acad. Sci. Hung. 3,15(1953).

Si^{30} 14 16

Levels Si(d,p) E_d= 8.21 a pc
d,p(θ) (5.07) l_n=0
(5.50) l_n=0 or 2

J.R.Holt, T.N.Marsham, Proc, Phys. Soc. 66A,467 (1953).

$Si^{31?}$ 14 17

Levels Si(d,p) E_d= 8.21 a pc
d,p(θ) (0.757) l_n=0
(1.699) l_n=0 or 2

J.R.Holt, T.N.Marsham, Proc. Phys. Soc. 66A,467 (1953).

Si^{32} 14 18

Abundance <4x10^{-6}% of natural silicon
No P^{33} β's observed, $Si^{32}(n,\gamma)$ $Si^{33} \rightarrow P^{33}$
Assumed $\sigma(n,\gamma)$ = 0.05

A.Turkevich, A.Tompkins, Phys. Rev. 90,247(1953).

P^{28} 15 13

τ 0.28^s Si(20-Mev p)
β^+ scin
γ 7
No α (< 10% of γ)

N.W.Glass, L.K.Jensen, J.R.Richardson, Phys. Rev. 90, 320 (1953).

P^{29} 15 14

β^+ 3.9 Si(6-Mev d)scin

M.Nahmias, T.Yuasa, Compt. rend. 236,2399(1953).

P^{32} 15 17

e^+/e^- (H_ρ = 1600) < 10^{-5} s

G.W.McClure, Phys. Rev. 91, 483A (1953).

S^{32} 16 16

Level S(n,n'γ) E_n= 14 scin
γ 2.32 n'γ

R.E.Garrett, F.L.Hereford, B.W.Sloope, Phys. Rev. 91, 441A (1953); verbal report.

S^{33} 16 17

Levels S^{32}(d,p) E_d= 8.18 a pc
d,p(θ)

Level	l_n	$d\sigma/d\Omega$†
g.s.	2	7.1
0.85	0	39
1.86	*	0.8
2.28	*	1.3
2.90	3	14
3.26	1	83

$_{16}S^{33}_{17}$

Level	l_n	$d\sigma/d\Omega$†
3.91	—	1.5
4.21	1	15
4.89	1	9.4
5.72	1	100
6.48**	1and2	41
7.44		
7.83		

† Relative at maximum of angular distribution
* Angular distribution isotropic
** Level is a doublet

J.R.Holt. T.N.Marsham, Proc. Phys. Soc. 66A, 467 (1953); Phys. Rev. 89, 665(1953).

Level A^{36}(n,α) E_n=2.15 to 4.40
1.1 ± 0.2 pc

B.J.Toppel, S.D.Bloom, Phys. Rev. 91,473A(1953).

Cl^{32} 17 15

τ 0.306^s S(20-Mev p)
β^+ scin
γ 4.8
No α (< 10% of γ)

N.W.Glass, L.K.Jensen, J.R.Richardson, Phys. Rev. 90, 320 (1953).

Cl^{33} 17 16

β^+ 4.2 S(6-Mev d)
scin

M.Nahmias, T.Yuasa, Compt. rend. 236,2399(1953).

Resonances $S^{32}(p,p)S^{32}$ E_p= 1.0 to 2.8
p,p(θ) 1.90 J=3/2- Γ < 0.025
2.31 J=1/2- Γ ~ 0.06

A.J.Ferguson, H.E.Gove, Phys. Rev. 91,439A(1953).

Cl^{34} 17 17 33^m

γ (0.145) α = 0.13 M3

W.Arber, P.Stähelin, Helv.Phys. Acta 26,433(1953).

1.5^s

τ 1.45^s Cl(γ,n)

W.Arber, P.Stähelin, Helv. Phys.Acta 26,433(1953).

Cl^{36} 17 19

Capture γ's Cl(n,γ) 2 cryst scin s

35†	0.70	14†	2.40
29†	1.12	10†	2.68
19†	1.77	23†	3.71
	2.03		4.67

W.A.Reardon, R.W.Krone, R.Stump, Phys. Rev. 91, 334; 91,442A (1953).

A

Neutron resonances (Mev) E_n=0.4 to 1.1

E_o	σ_o
0.58	~3.5
0.60	~3.5
0.74	~3.5

J.B.Guernsey, C.Goodman, Phys. Rev. 91,440A(1953); verbal report.

A^{37} 18 19
τ 32^d A^{36}(pile n)
E_{dis} 0.815 scin a
continuous γ endpoint
C.E.Anderson, G.W.Wheeler, W.W.Watson, Phys. Rev. 90, 606 (1953).

A^{38} 18 20
A^{36}/A^{38} variation of >300% for various pitchblende ores suggests A^{38} formation by α's or fission n's
W.H.Fleming, H.G.Thode, Phys. Rev. 90,857(1953).

A^{41} 18 23
γ (1.3) $\tau = 6.6x10^{-9s}$ $\beta\gamma$
T.C.Engelder, Phys. Rev. 90, 259 (1953).

Ca^{39} 20 19
τ 1.00^s Ca($\leqslant$ 25-Mev γ)
R.G.Summers-Gill, R.N.H.Haslam, L. Katz, Can. J. Phys. 31, 70 (1953).

τ 1.00^s Ca($\leqslant$ 30-Mev γ)
β^+ 6.7 a
R.Braams, C.L.Smith, Phys. Rev. 90, 995 (1953).

Ca^{40} 20 20
Levels Ca(p,p') E_p=6.92 to 8.15
3.35 3.90 s
3.71 4.49
C.M.Braams, C.K.Bockelman, C.P.Browne,W.W. Buechner, Phys. Rev.91,474A (1953);verbal report.

Ca^{41} 20 21
Levels Ca(d,p) E_d= 8.13 ppl
d,p(θ)

Level	l_n	$d\sigma/d\Omega$†
g.s.	3	3.8
1.90	1	23
2.42	1	10
2.9		
3.6		
3.96	2 or 1	6
4.76	2	7.2
5.72	2	7.8

†mb/sterad at maximum of angular distribution
J.R.Holt, T.N.Marsham, Proc. Phys. Soc. 66A,565 (1953).

Ca^{43} 20 23
I 7/2 I
μ -1.3157
C.D.Jeffries, Phys. Rev. 90, 1130 (1953).

Ca^{47} 20 27
τ 4.8^d
p 3.4^dSc Ca(th n)
ion chem
L.G.Cook, K.D.Shafer, Phys. Rev. 90,1121(1953).

Sc^{43} 21 22
τ 3.95^h Ca(7-Mev p) chem
J.E.Duval, M.H.Kurbatov, J.Am. Chem. Soc. 75, 2246 (1953).

Sc^{46} 21 25
β^- 0.22% 1.25 F-K plot not linear s
F.H.Schmidt, G.L.Keister, Phys. Rev. 91,483A (1953).

No delayed $\gamma\gamma$ (τ < $1.5x10^{-9s}$)
C.E.Whittle, F.T.Porter, Phys. Rev. 90,498(1953).

Sc^{47} 21 26
β^- ~66% 0.435 Ti^{49}(10-Mev d)
~34% 0.622 sl
γ 0.185 scin
(0.44β)(γ) No(0.62β)(γ)
L.S.Cheng, M.L.Pool, Phys. Rev. 90,886 (1953).

τ 3.44^d Ca(7-Mev p) chem
J.E.Duval, M.H.Kurbatov, J. Am. Chem. Soc. 75, 2246 (1953).

Sc^{48} 21 27
γ 100† (0.98) scin
100† 1.05
100† (1.33)
From comparison with V^{48} No 2.2γ
M.J.Sterk, A.H.Wapstra, R.E.W.Kropveld, Physica 19, 135 (1953).

V^{48} 23 25
τ 16.4^d
(1.32γ)(0.99γ)(θ) I = 4,2,0
P.Meyer, S.Schlieder, Z. Phys. 135, 119 (1953).

γ 0.98 scin
1.33
2.22 ± 0.10
ϵ/β^+ = 0.46
M.J.Sterk, A.H.Wapstra, R.E.W.Kropveld, Physica 19, 135 (1953).

γ (0.99) τ< 2 x 10^{-9s} $\beta\gamma$
(1.32) τ< 2 x 10^{-9s} $\beta\gamma$
T.C.Engelder, Phys. Rev. 90, 259 (1953).

Cr^{49} 24 25
τ 41.7^m Ti(40-Mev α)
β^+ 15† 0.73 chem sl
35† 1.39
50† 1.54
γ 0.153 α_K = 0.02 M1 ce;pe⁻
0.609 α_K = < 4 x 10^{-4} pe⁻
No 0.762 γ
B.Crasemann, H.T.Easterday, Phys. Rev. 90,1124 (1953).

Cr^{53} 24 29
μ -0.47351 I
$\nu(Cr^{53})/\nu(N^{14})$=0.78226±0.00005 Na_2CrO_4
F.Alder, K.Halbach, Helv. Phys. Acta 26,426(1953).

Mn^{56} 25 31
τ 2.581^h ± 0.003 Mn(pile n)
Counted 2 samples each for 10 half-lives
R.M.Bartholomew, F.Brown, W.D.Howell, W.R.J. Shorey, L. Yaffe, Can. J. Phys. 31,714 (1953).

γ (0.85) τ<$2x10^{-9s}$ $\beta\gamma$
T.C.Engelder, Phys. Rev. 90, 259 (1953).

Fe
γ's Fe(n,n'γ) E_n= 14 scin
0.85 n'γ
1.29
1.42
2.1
R.E.Garrett, F.L.Hereford, B.W.Sloope, Phys. Rev. 91, 441A (1953); verbal report.

Fe^{57} 26 31
μ <0.05 para
R.S.Trenam, Proc. Phys. Soc. 66A,414 (1953).

Fe^{59} 26 33 — $\gamma\gamma\ (\theta)$ scin
Agrees with I = 3/2, 5/2, 7/2
Excludes I = 5/2, 3/2, 7/2

D.Schiff, F.H.Metzger, Phys. Rev. 90, 849 (1953).

Co^{60} 27 33 10.7^m — τ $10.47^m \pm 0.02$ Co(pile n)
Counted 6 samples each for 7 half-lives

R.M.Bartholomew, F.Brown, W.D.Howell, W.R.J.Shorey L.Yaffe, Can. J. Phys. 31, 714 (1953).

5.2^y — $\gamma\gamma(\theta)$ I=4,2,0 b= 0.167

J.S.Lawson, Jr., H.Frauenfelder, W.K.Jentschke, Phys. Rev. 91, 484A; 91, 649 (1953).

$\gamma\gamma(\theta)$ I=4,2,0 b= 0.166

S.Chatterjee, A.K.Saha, Z.Phys. 135, 141 (1953).

γ (1.17) $\tau < 2 \times 10^{-9s}$ $\beta\gamma$
(1.33) $\tau < 2 \times 10^{-9s}$ $\beta\gamma$

T.C.Engelder, Phys. Rev. 90, 259 (1953).

Co^{60} 27 33 — Capture γ's Co(n,γ) 2 cryst scin s

100†	0.52
19†	1.30
20†	2.00
	2.39?
19†	3.58

W.A.Reardon, R.W.Krone, R.Stump, Phys. Rev. 91, 334; 91, 442A (1953).

Cu — γ's Cu(n,n'γ) E_n=14 scin n'γ
1.1
1.55
2.14

R.E.Garrett, F.L.Hereford, B.W.Sloope, Phys. Rev. 91, 441A (1953); verbal report.

Cu^{61} 29 32 — γ (0.65) $\tau < 2 \times 10^{-9s}$ $\beta\gamma$

T.C.Engelder, Phys. Rev. 90, 259 (1953).

Cu^{63} 29 34 — q -0.16 para

B. Bleaney, K.D.Bowers, R.S.Trenam, Proc. Phys. Soc. 66A, 410 (1953).

Cu^{65} 29 36 — q -0.15 para

B. Bleaney, K.D.Bowers, R.S.Trenam, Proc. Phys. Soc. 66A, 410 (1953).

Cu^{66} 29 37 — τ $5.07^m \pm 0.02$ Cu(pile n)
Counted for 9 half-lives β electroscope

R.M.Bartholomew, F.Brown, W.D.Howell, W.R.J.Shorey, L.Yaffe, Can. J. Phys. 31, 714 (1953).

γ (1.04) $\tau < 2\text{x}10^{-9s}$ $\beta\gamma$

T.C.Engelder, Phys. Rev. 90, 259 (1953).

Cu^{67} 29 38 — τ 61^h Ni(40-Mev α)
β^- 45% 0.395 Zn(195-Mev d) chem; sl

$_{29}Cu^{67}_{38}$
35% 0.484
20% 0.577
γ 0.092 α = 0.5 E2
0.182 α = 0.012 M1

H.T.Easterday, Phys. Rev. 91, 653 (1953).

β^- 0.37 Zn(27-Mev d) $a/\beta\gamma$
0.45 $a/\beta\gamma$
~55% 0.55 a
γ st 0.094 scin
st 0.19
w 0.30
w 0.39
(0.37β)(0.19γ) (0.45β)(0.09γ)

R.H.Nussbaum, A.H.Wapstra, N.F.Verster, Physica, 19, 131 (1953).

Cu^{68} 29 39 — τ 32^s Zn($\leqslant$ 15-Mev n) chem; a
β^- ~3.0 Ga($\leqslant$ 15-Mev n)
γ weak

A.Flammersfeld, Z.Naturf. 8a, 274 (1953).

Zn^{64} 30 34 — $\tau_{\epsilon\epsilon}$ $>8\text{x}10^{15y}$ pc

A.Berthelot, R.Chaminade, C.Levi, L.Papineau, Compt. rend. 236, 1769 (1953).

Zn^{65} 30 35 — β^+ 0.327 sl
γ (1.11) α = $1.8\text{x}10^{-4}$
γ/β^+ = 26±6 Na^{22} comparison and ce^-/β^+
No 0.20γ (< $3\text{x}10^{-4}$) sl pe^-

M.Sakai, P.Hubert, Compt. rend. 236, 1249 (1953).

γ (1.11) α = $2.5\text{x}10^{-4}$sl ce^-, Cpt

E.F.Sturcken, A.H.Weber, Phys. Rev. 91, 484A (1953).

γ/β^+ = 31 ± 5 Na^{22} comparison
No 0.20γ (< 0.1%) scin

N.Perrin, J. Phys. radium 14, 273 (1953).

ϵ_K/β^+ = 33±3 pc

P.Avignon, Compt. rend. 237, 157 (1953).

Ga^{64} 31 33 — τ 2.5^m Zn^{64}(8.1-Mev p)
β^+ ~5 chem scin
γ 0.97
2.2?
3.8
E_{dis}= 7.2±0.5 from (p,n) threshold

B.L.Cohen, Phys. Rev. 91, 74 (1953).

τ 2.6^m Zn^{64}(9.5-Mev p)
β^+ Zn(19-Mev d) Cu(40-Mev α) chem

B.Crasemann, Phys. Rev. 90, 995 (1953).

Ga^{65} 31 34 — β^+ 90% 2.1 Zn(19-Mev d) Cu(40-Mev α)
10% 2.52 chem; sl

B.Crasemann, Phys. Rev. 90, 995 (1953).

Ga^{67} 31 36

ϵ — Zn(p) ion chem

γ

Intensity	Energy	α_K	K/L	
2.7%	0.090	0.074		M1
63.9%	0.092	0.63	7.0	E2
29.6%	0.182	0.011	12.6	M1
1 %	0.206	0.029	~14	
20.2%	0.296	0.0029	7.6	M1
4.9%	0.388	0.0019		M1
0.4%	0.496			
0.2%	0.790			sl ce⁻ pe⁻, scin
0.4%	0.880			

$(0.206\gamma)\ (0.090\gamma, 0.182\gamma)$ (all γ's) (γ)
$(0.496\gamma)\ (0.296\gamma, 0.388\gamma)$
$(0.090\gamma, 0.296\gamma)\ (0.092\gamma)$ delay of $8.5^{\mu s}$
No other delay ($<5\times10^{-7\,s}$)
Decay scheme, spins proposed

B.H.Ketelle, A.R.Brosi, F.M.Porter, Phys. Rev. 90, 567 (1953).

Ge

Relative abundances — GeF_4; ms

A	70	72	73	74	76
	20.52	27.43	7.76	36.54	7.76

J.H.Reynolds, Phys. Rev. 90, 1047 (1953).

As^{71} 33 38

τ 60^h — Ge(25-Mev d) ms chem
β+ w ~0.307 — s
0.82
γ 0.0233 — s ce⁻
0.175

H.Atterling, S.Thulin, Nature 171, 927 (1953).

τ 60^h — Ge(14-Mev d) chem
β+ 0.80 — $s\pi\sqrt{2}$
γ 0.175 K/LM = 8.3
$ce_K^-/\beta+ = 0.14$

P.H.Stoker, O.P.Hok, Physica 19, 279 (1953).

As^{72} 33 39

γ 0.697 — Ge(14-Mev d) chem $s\pi\sqrt{2}$ ce⁻
$ce_K^-/\beta+ = 0.0090$

P.H.Stoker, O.P.Hok, Physica 19, 279 (1953).

As^{73} 33 40

γ 0.0130 — Ge(14-Mev d)
0.053 K/LM=5.2 — chem; ce⁻

P.H.Stoker, O.P.Hok, Physica 19, 279 (1953).

γ 0.0135 α= large — $\tau = 4.6^{\mu s}$
0.054 — $900^{\mu s} < \tau < 10^s$
0.0135 γ follows 0.054 γ — scin

J.P.Welker, A.W.Schardt, J.J.Howland, Jr., G.Friedlander, Phys. Rev. 91, 484A (1953).

As^{75} 33 42

No isomeric state observed after 5 min. separation of As from Se^{75}

E.N.Jensen, L.J.Laslett, D.S.Martin, Jr., F.J. Hughes, W.W.Pratt, Phys. Rev. 90, 557 (1953).

As^{76} 33 43

$(\sim 2\beta)\ (\sim 0.6\gamma)\ (\theta)$ b = 0.076 — sl

M.Rose, Phil. Mag. 44, 739 (1953).

Se^{75} 34 41

ϵ (no β's) — Se(pile n)
γ — sl ce⁻ pe⁻

Intensity	Energy		
0.5%	0.067		
14%	0.077		
6.5%	0.098	α_K~8	K/L=11
~3%	0.124	α_K~0.3	
24%	0.138	α_K=0.12	
0.04%	0.203		
71%	0.269	α_K=0.09	
~5%	0.281		
0.03%	0.308		
14%	0.405	α_K=0.0015	

No 0.0247 γ — No delayed $\gamma\gamma(0.3^{\mu s}-10^{\mu s})$
$(<0.15\gamma)\ (\gamma)$ — Decay scheme proposed

E.N.Jensen, L.J.Laslett, D.S.Martin, Jr., F.J. Hughes, W.W.Pratt, Phys. Rev. 90, 557 (1953).

Se^{77} 34 43

μ 0.53262 — H_2Se Mic
$\nu(Se^{77})/\nu(D) = 1.24211 \pm 0.00010$

H.E.Walchli, Phys. Rev. 90, 331 (1953).

Se^{82} 34 48

τ $>10^{17\,y}$ — Se chem
No 36^h Br detected

H.D.Sharma, Curr. Sci. 22, 45 (1953).

Br^{80} 35 45 18^m

No γ ($\gamma/\beta^+ \leqslant 1.25$)

J.Laberrique-Frolow, R. Bernas, H.Langevin, Compt. rend. 236, 1246 (1953).

Kr^{85} 36 49

τ 10.27^y — U(n,f) chem ms
From decrease in abundance in seven years

R.K.Wanless, H.G.Thode, Can. J. Phys. 31, 517 (1953).

Sr^{89} 38 51

Levels — Sr(d,p) — E_d= 8.01 ppl

1.07	4.73
2.09	5.46
2.66	

J.R.Holt, T.N.Marsham, Proc. Phys. Soc. 66A, 565 (1953).

Sr^{91} 38 53

τ 9.67^h — U(n,f) chem sl

	Intensity	Energy	
β^-	7%	0.61	
	33%	1.09	
	29%	1.36	
	4%	2.03	
	27%	2.67	ΔI=2, yes shape
γ	20.5†	0.552	$s\pi$ pe⁻ scin
	5.2†	0.645	
	9.2†	0.748	
	1.1†	0.93	
	10.4†	1.025	
	1.8†	1.413	

$(\gamma)\ (0.65\gamma)$ $(\gamma)\ (0.93\gamma)$ $(\gamma)\ (1.41\gamma)$

D.RAmes, M.E.Bunker, L.M.Langer, B.M.Sorenson, Phys. Rev. 89, 903A; 91, 68 (1953).

Y^{88} 39 49

$(0.908\gamma)\ (1.85\gamma)\ (\theta)$ I=3,2,0
γ (0.908) (E)1 (M)2<0.001%

J.Varma, B.L.Saraf, W.B.Todd, Jr., Phys. Rev. 91, 484A (1953).

$(0.908\gamma)\ (1.85\gamma)\ (\theta)$ I=3,2,0
γ (0.908) (E)1 (M)2 0.002-0015%

R.M.Steffen, Phys. Rev. 90, 321 (1953).

Y^{91} 39 52 51^m

τ 50.3^m d 9.7^h Sr chem
γ 0.551 α_K=0.046 $s\pi$ ce$^-$ K/LM=6.0 M4
No β^- (< 1.5% of IT)

D.P.Ames, M.E.Bunker, L.M.Langer, B.M.Sorenson, Phys. Rev. 89, 903A; 91 68 (1953).

Zr^{95} 40 55

τ 65^d Zr^{94}(pile n,γ) U(pile n,f)
β^- ~49% ~0.360 $s\pi\surd 2$
~49% ~0.400
~ 2% 0.910
γ 0.235 K/L = 4.5 $s\pi$ ce$^-$
0.725 K/L = 5
0.758

J.M.Cork, J.M.LeBlanc, D.W.Martin, W.H.Nestor, M.K.Brice, Phys. Rev. 90, 579 (1953).

Zr^{96} 40 56

$\tau_{\beta\beta}$ 6x10^{16y} 89.5% Zr^{96} scin
β or γ of 3.8±0.5

J.A.McCarthy, Phys. Rev. 90, 853 (1953).

Nb^{95} 41 54 90^h

γ 0.235 K/L = 4.5 $s\pi$ ce$^-$

J.M.Cork, J.M.LeBlanc, D.W.Martin, W.H.Nestor M.K.Brice, Phys. Rev. 90, 579 (1953).

35^d

τ_2 35.0^d d 65^{d}Zr; chem
β^- 0.165 $s\pi\surd 2$
γ 0.753 $s\pi$ ce$^-$
0.768 K/L = 7.6
Evidence for low energy γ a

J.M.Cork, J.M.LeBlanc, D.W.Martin, W.H.Nestor, M.K.Brice, Phys. Rev. 90, 579 (1953).

Mo^{93} 42 51 6.7^h

		α_K*	K/L	
γ				$s\pi$ ce$^-$
	0.262	0.53	3.09	E4
	0.684	1.5x10^{-3}	8	M1
	1.479	2.4x10^{-4}		E2,M1

Mo x rays crit a, cryst
*Based on α (0.262γ) = 0.7

C.W.Forsthoff, R.H.Goeckermann, R.A. Naumann, Phys. Rev. 90, 1004 (1953).

Tc^{99} 43 56 5.9^h

τ (metal) 6.04^h ic
τ dependent on chemical state

K.T.Bainbridge, M.Goldhaber, E.Wilson, Phys. Rev 90, 430 (1953).

Rh

Neutron resonance (ev) cryst s
1.260±0.004 σ_o = 5000±200
Γ =0.156±0.005

V.L.Sailor, Phys. Rev. 91, 53; 90, 363A(1953).

Rh^{104} 45 59 4.3^m

γ 14† 0.0511 K/L >5 $s\pi$ ce$^-$
170† 0.0772 K/L ~0.6 scin
(0.051γ) (χ) $\chi\chi$ Rh(pile n)
†Relative intensity ce$^-$

W.C.Jordon, J.M.Cork, S.B.Burson, Phys. Rev. 90, 862(1953).

$_{45}Rh^{104}_{59}$ 44^s

γ 0.55 Rh(pile n);scin
w ~1.2
No (0.55γ) (χ) No (0.55γ) (γ)

W.C.Jordan, J.M.Cork, S.B.Burson, Phys. Rev.90, 862 (1953).

Pd^{109} 46 63 13^h

τ_2 13.6^h Pd(pile n);chem
Counted for 15 half-lives G-M counter

W.W.Meinke, Phys. Rev. 90, 410 (1953).

Pd^{112} 46 66

γ 0.018 U(28-Mev d)scin chem

R.Nussbaum, R.H.Wapstra, A.H.Verster, N.F.Cerfontain, H.Cerfontain, Physica 19,385 (1953).

Ag^{106} 47 59 8.6^d

No β^+ (<1% of ϵ) scin

W.L.Bendel, F.J.Shore, H.N.Brown, R.A.Becker, Phys. Rev. 90, 88 (1953).

24.5^m

τ_2 24.0^m Ag(22-Mevγ)
β^+ 17% 1.45 $s\pi\surd 2$
83% 1.96
β^-(?) <1% 0.36
γ 17% 0.512 α_K~3x10^{-3} scin, ce$^-$
ϵ_K/(0.512γ+annhil γ's) = 0.28
High energy photons probably bremsstrahlung

W. L.Bendel, F.J.Shore, H.N.Brown, R.A.Becker, Phys. Rev. 90, 888 (1953).

Ag^{109} 47 62 39^s

γ (0.087) α_K~9 d 13^{h}Pd scin

R.Nussbaum, R.H.Wapstra, A.H.Verster, N.F.Cerfontain, H.Cerfontain, Physica 19,385 (1953).

Ag^{112} 47 65

β^- 15% ~1 U(28-Mev d) a
20% 2.7 chem $\alpha\beta\gamma$
40% 3.5
25% 4.1
γ 0.62 scin
No (4.1β) (γ)

R.Nussbaum, R.H.Wapstra, A.H.Verster, N.F.Cerfontain, H.Cerfontain, Physica 19,385 (1953).

Cd

Neutron resonance (ev)
0.180 σ_o= 7800 Γ = 0.113

B.N.Brockhouse, Can. J. Phys. 31, 432 (1953).

Neutron resonances (ev) E_n= 1 to 4000 ev

	18.0		
st	27.2	Cd^{111}	$\sigma_o\Gamma^2$ = 35
	66.6	Cd^{112}?	
st	88.2	Cd^{110}?	
	122	Cd^{116}?	
	163		
	234		
	400		
	540		

R.R.Palmer, L.M.Bollinger, Phys. Rev. 91,450A (1953); verbal report.

Cd^{114} 48 66
Capture γ's Cd(n,γ) 2 cryst scin s
33† 0.88
13† 1.33
38† 1.61
26† 2.44
34† 3.61
4.67
5.17

W.A.Reardon, R.W.Krone, R. Stump, Phys. Rev. 91, 442A; 334 (1953).

In
Neutron resonance (ev)
1.458 σ_0=27,000 Γ=0.114
σ_{so}=1,600 Γ_n/Γ= 0.045

L.B.Borst, Phys. Rev. 90, 859 (1953).

In^{110} 49 61 4.9^h
τ_1 4.9^h Ag(20-Mev α)
γ IT 195* 0.121 K/LM=4.5 chem; sl ce^-
100* 0.657
42* 0.884
27* 0.937
* Relative intensity of ce^-

E.Bleuler, J.W.Blue, S.A.Chowdary, A.C.Johnson, D.J.Tendam, Phys. Rev. 90, 464 (1953).

65^m
β+ 2.25 Ag(20-Mev α) sl
γ 0.656 chem sl ce^-
(2.25β) (γ) No 2.9β+ (<3%) aβγ

E.Bleuler, J.W.Blue, S.A.Chowdary, A.C.Johnson, D.J.Tendam, Phys. Rev. 90, 464 (1953).

In^{112} 49 63 23^m
τ_1 20.7^m Ag(20-Mev α) chem
γ 0.155 α large K/LM = 3.7 sπ

E. Bleuler, J.W.Blue, S.A.Chowdary, A.C.Johnson, D.J. Tendam, Phys. Rev. 90, 464 (1953).

9^m
τ_2 14.5^m d 21^mIn Ag(20-Mev α)
β^- 44% 0.656 s
β+(+ε) 56% 1.52
No βγ

E.Bleuler, J.W.Blue, S.A.Chowdary, A.C.Johnson, D.J.Tendam, Phys. Rev. 90, 464 (1953).

In^{114} 49 65 72^s
(β)(possible 1.2γ) <0.3% of β's aβγ

R.H.Nussbaum, R.Van Lieshout, Physica 19,451. (1953).

Sn^{124} 50 74
$\tau_{\beta\beta}$ >1.5×10^{17y} 95% Sn^{124} scin

J.A.McCarthy, Phys. Rev. 90, 853 (1953).

Te^{130} 52 78
>10^{17y} Te chem

H.D. Sharma, Curr. Sci. 22, 45 (1953).

I^{127} 53 74
Level I(n,n'γ) E_n=14 scin
γ's 0.7-0.8 n'γ
No other γ's observed

R.E. Garrett, F.L.Hereford, B.W.Sloope, Phys.Rev. 91, 441A (1953); verbal report.

I^{128} 53 75
γ 100† 0.455 scin
2† 0.98

A.H. Wapstra, N.F.Verster, M. Boelhouwer, Physica 19, 138 (1953).

I^{129} 53 76
$Q(I^{129})/Q(I^{127})$= 0.701213 ±0.000015 SnI_4; quad res

R.Livingston, H.Zeldes, Phys. Rev. 90, 609(1953).

β^- 0.150 ΔI= 2, no s
γ 0.038 α_K= 19 M1
No 0.188 β (< 1%) scin

E.der Mateosian, C.S.Wu, Phys. Rev. 91, 497A, (1953); verbal report.

I^{131} 53 78
τ 8.07^d±0.02 electroscope
Counted 3 samples for ~5 half-lives

H.H.Seliger, L. Cavallo, S.V.Culpepper, Phys. Rev. 90, 443 (1953).

No (0.638γ) (0.080γ) aγγ
(0.284γ) (0.080γ) (θ) isotropic scin

D.Schiff, F.R.Metzger, Phys. Rev. 90, 849 (1953).

Cs^{127} 55 72
γ 0.125 I(56-Mev α)
0.41 scin

A.H.Wapstra, N.F.Verster, M.Boelhouwer, Physica 19, 138 (1953).

Cs^{128} 55 73
τ 3.5^m d 2.4^d Ba
β+ 1.1±0.7 chem aβγ
3.1 s
γ 100† 0.135 scin
0.29
30† 0.455
w 0.97
(~1.1β) (γ) γγ No (3.1β) (γ)
γ's could belong to Ba^{128}

R.W.Fink, E.O Wiig, Phys. Rev. 91, 194 (1953).

τ 3.9^m I(56-Mev α)
γ ~0.46 scin
1.5
(K x ray)/β+ = 0.4

A.H. Wapstra, N.F.Verster, M.Boelhouwer, Physica 19, 138 (1953).

Cs^{129} 55 74
γ 95† 0.385 I(56-Mev α)
5† 0.560 scin
0.040 γ not observed

A.H. Wapstra, N.F.Verster, M.Boelhouwer, Physica 19, 138 (1953).

Cs^{132} 55 77
γ 0.69 Cs(26-Mev d) scin

A.H. Wapstra, N.F.Verster, M.Boelhouwer, Physica 19, 138 (1953).

Cs^{134} 55 79 2.3^y
β^- 10% ~0.08 Cs(pile n)
3% ~0.21 sπ2
6% 0.410
81% 0.657

$_{55}Cs^{134}_{79}$ 2.3 y

γ

	K/L		K/L
0.202*		0.797	7.3
0.475	~5	0.803*	
0.563	~10	1.039	~10
0.570*		1.168	~10
0.605	6.4	1.368	~10
0.663*			s ce^-, pe^-

* ce^-_K only observed

J.M.Cork, J.M.LeBlanc, W.H.Nester, M.K.Brice, Phys. Rev. 89, 907A; 90, 444 (1953).

Ba^{128} 56 72

τ 2.4^d Cs(240-Mev p)
ϵ 100% p 3.5^m Cs chem
See Cs^{128} for possible γ's

R.W.Fink, E.O Wiig, Phys. Rev. 91, 194 (1953).

Ba^{129} 56 73

$\beta+$ 1.6 Cs(60-Mev p) s chem

R.W.Fink, E.O.Wiig, Phys. Rev. 91, 194 (1953).

Ba^{131} 56 75

τ 11.8^d Ba^{130}(pile n)
γ

	K/L		K/L
0.055	≤1	0.249	≥6
0.079	10	0.374	6.0
0.092		0.489	
0.124	3.6	0.498	7.7
0.133	5.8	0.585	
0.216	9	0.620	
0.239	≥6		s ce^-, pe^-

No 0.82 or 1.2 γ scin

J.M.Cork, J.M.LeBlanc, W.H.Nester, M.K.Brice, Phys. Rev. 91, 76; 91, 497A (1953).

γ Ba(pile n) chem scin

w	
	~0.10
55†	0.122
45†	~0.220
25†	0.370
100†	0.500
6†	0.620
3†	0.90*
3†	1.02*

x 145† K x ray
(0.12γ) (0.50γ) *Possible impurities

W. Payne, M.Goodrich, Phys. Rev. 91, 497A (1953); verbal report.

Ba^{133} 56 77 39^h

γ 0.276 Ba(pile n)

J.M. Cork, J.M.LeBlanc, W.H.Nester, M.K.Brice, Phys. Rev. 91, 76 (1953).

Ba^{135} 56 79 29^h

γ 0.268 Ba(pile n)

J.M. Cork, J.M.LeBlanc, W.H.Nester, M.K.Brice, Phys. Rev. 91, 76 (1953).

La

No neutron resonances E_n=0.1 to 30 ev

V.L. Sailor, H.H.Landon, H.L.Foote, Phys. Rev. 91 450A (1953).

La^{142} 57 85

β^- >2.5 U(n,f) chem; a
γ 90† 0.63 scin
10† 0.87
(<2.5β) (γ)

A.V. Bosch, Physica 19, 374 (1953).

Ce

No neutron resonances E_n=0.1 to 30 ev

V.L.Sailor, H.H.Landon, H.L.Foote, Phys. Rev. 91, 450A (1953).

Pr

No neutron resonances E_n=0.1 to 30 ev

V.L.Sailor, H.H.Landon, H.L.Foote, Phys. Rev. 91, 450A (1953).

Pr^{140} 59 81

$\beta+$ 2.4 Pr(≲70-Mev γ) scin

F.I.Boley, Iowa State Coll. J. Sci. 27,129(1953).

Pr^{144} 59 85

$\gamma\gamma$ polarization - direction scin
I = 1-,2+,0+

D.M.Roberts, Phys. Rev. 91, 497A (1953); verbal report.

Nd

Relative abundances

A	142	143	144	145
%	27.09	12.14	23.83	8.29
A	146	148	150	
%	17.26	5.74	5.63	

W.H.Walker, H.G.Thode, Phys. Rev. 90,447 (1953).

Eu

Neutron resonances (ev) E_n=0.1 to 30 ev

0.46	2.72	7.32
1.06	3.35	8.95
1.77	3.85	15.2
2.47	6.2	20

V.L.Sailor, H.H.Landon, H.L.Foote, Jr., Phys. Rev. 91, 450A (1953); verbal report.

Eu^{147} 63 84

τ 24^d Sm^{147}(6.7-Mev p)
γ 0.12 scin
0.21 sπ ce^-
No $\beta+$

R.C.Mack, J.J.Neuer, M.L.Pool, Phys. Rev. 91,497A (1953).

Eu^{148} 63 85

τ 54^d Sm^{148}(6.7-Mev p)
γ 0.58 sπ ce^-

R.C.Mack, J.J.Neuer, M.L.Pool, Phys. Rev. 91,497A (1953).

Eu^{149} 63 86

τ 120^d Sm^{149}(6.7-Mev p)
γ 0.30 scin, sπ ce^-
0.57

R.C.Mack, J.J.Neuer, M.L.Pool, Phys. Rev. 91,497A (1953); verbal report.

Eu^{150} 63 87

τ 13.7^h Sm^{150}(6.7-Mev p)
β^- 1.07 sπ
No $\beta+$
F-K plot complex? but no γ, no ce^-

R.C.Mack, J.J.Neuer, M.L.Pool, Phys. Rev. 91,903; 91, 497A (1953).

Gd

Neutron resonances (ev) E_n= 0.7 to 1000 ev

1.93	14.4	49
2.58*	16.6	81
2.85*	20.6*	109

Gd

6.26	22.2*	355
7.74	29.8	740
11.6	33.2	

E_0=2.58 σ_0=1600 Γ = 0.07 ev
* Most prominent

R.R.Palmer, L.M.Bollinger, Phys. Rev. 91,450A (1953); verbal report.

Gd^{150} 64 86

τ_α >10^{5y} ic cc
No α daughter from 13.7^h Eu found

R.C.Mack, J.J.Neuer, M.L.Pool, Phys. Rev. 91,903 (1953).

Tb^{157} 65 92

τ >100^y or <30^m
Not observed from Tb(24-Mev p) or as d of 8.2^h Dy

T.H.Handley, E.L.Olson, Phys. Rev. 90,500 (1953).

Dy

Neutron resonances (ev) E_n= 0.1 to 30 ev

1.72	5.47	16.8
2.72	7.8	19.5
3.7	10.6	29.5
4.3	13.5	38.5

V.L.Sailor, H.H.Landon, H.L.Foote, Jr., Phys. Rev. 91, 450A (1953); verbal report.

Dy^{157} 66 91

τ 8.2^h Tb(19-Mev p)
γ 0.325 ion chem, rel σ
No β+ or e^- observed scin

T.H. Handley, E.L.Olson, Phys. Rev. 90,500(1953).

Dy^{165} 66 99 1.3^m

γ 0.1080 Dy(pile n)
K : L_{II} : L_{III} : M: N
3 : 10 : 10 : 5: 1.5
0.155? scin, $s\pi$ ce^-
0.361
0.515
($\sim$ 1β) (0.36γ,0.52γ) No (0.36γ) (0.52γ)

W.C. Jordan, J.M.Cork, S.B.Burson, Phys. Rev. 91, 497A (1953); verbal report.

2.4^h γ 0.0944 Dy(pile n)
K :L :M
60 :7.8 :1.5
0.279 K/L >5 $s\pi$ ce^-
0.361 K/L >5
0.634
0.71
1.02
($\sim$ 0.3β) (0.28γ,0.36γ,0.63γ)
($\sim$ 1.3β) (0.094γ)
(0.28γ) (0.71γ) (0.36γ) (0.63γ) No other $\gamma\gamma$

W.C. Jordan, J.M.Cork, S.B.Burson, Phys. Rev. 91, 497A (1953).

Hf

Relative abundances HfF_4; ms

A	174	176	177
%	0.199	5.23	18.55
A	178	179	180
%	27.23	13.73	35.07

J.H.Reynolds, Phys. Rev. 90, 1047 (1953).

Ta^{182} 73 109 117^d

γ

0.22	0.29	1.23	sl pe^-
0.25	0.31	1.24	
0.27	1.01		
0.28	1.13		

R.M.Pearce, K.C.Mann, Can. J. Phys. 31, 592 (1953).

W^{185} 74 111

No 0.134 γ W(pile n)
scin, $s\pi$ ce^-

N. Lazar, R.J.D.Moffat, L.M.Langer, Phys. Rev. 91, 498A (1953).

Re^{186} 75 111

β^- 0.08% ($\sim$0.3)

J.E. Robinson, C.E.Whittle, P.S.Jastram, Phys. Rev. 91, 498A (1953).

(0.93β) (0.14γ) (θ) b <0.0007

C.E. Whittle, J.P.Hurley, P.S.Jastram, Phys. Rev. 91, 498A (1953); verbal report.

Au^{197} 79 118 7.4^s

γ d 23^h Hg $s\pi$ ce^-; scin
IT 0.130 K :L_I :L_{II} :L_{III}:M α_K≤2
10:<2:$\sim$54:21:36 E3
0.279 K :L $\alpha_K$$\sim$0.27
>60:10 M1

0.191γ , 0.077γ, previously assigned to decay of 23^h Hg through 7.4^s Au, now assigned to 65^h Hg decay. New assignment based on above E3 0.130 γ, now resolved from 0.134γ, and on new threshold for Au(n,n')7.4^s Au of <0.42*

J.W.Mihelich, A.de-Shalit, Phys. Rev. 91, 78 (1953); * H.C.Martin, ibid.

Au^{198} 79 119

γ (0.68) (E)2 60% (M)1 40%
(0.68γ) (0.41γ) I = 2,2,0 $\gamma\gamma(\theta)$

D.Schiff, F.R.Metzger, Phys. Rev. 90,849(1953).

Hg

Neutron resonances (ev) E_n=0.7 to 1500 ev

23.1*	91	311*
33.3*	127	437
42.8	175*	1230
71	204	

* Most prominent

R.R.Palmer, L.M.Bollinger, Phys. Rev. 91, 450A (1953).

Hg^{197} 80 117 23^h

γ Au^{197}(p,n) $s\pi$ ce^-
L_I :L_{II} :L_{III}
0.134 0.4:11:10 E2
0.165 10 :<1:15 M4

65^h 0.0774* 100:45:34 M1+E2
0.191* K/L=6

* Previously assigned to 7.4^s Au, q.v.

J.W.Mihelich, A.de-Shalit, Phys. Rev. 91,78(1953)

Tl^{203} 81 122

$\mu(Tl^{203})/\mu(Tl^{205})$ = 0.990258 ± 0.000001 I
Resonance frequencies depend on anions in solution; shifts same for Tl^{203},Tl^{205}

H.S.Gutowsky, B.R.Garvey, Phys. Rev. 91, 81(1953).

$Tl^{208}_{81\ 127}$ No 5.1 β (<0.2%)

P.E. Cavanagh, quoted by P.Marin, G.R.Bishop, H. Halban, Proc. Phys. Soc. 66A, 608 (1953).

$Pb^{207}_{82\ 125}$ 0.8^s — τ 0.9^s d 50^y Bi chem

G. Friedlander, E.Wilson, A.Ghiorso, I.Perlman, Phys. Rev. 91, 498A (1953).

$Pb^{212}_{82\ 130}$ τ 10.64^h ± 0.03
Measured for 3 half-lives with ic

P. Marin, G.E.Bishop, H.Halban, Proc. Phys. Soc. 66A, 608 (1953).

$Pb^{214}_{82\ 132}$ γ 0.292 sl pe$^-$
0.350

R.M.Pearce, K.C.Mann, Can. J.Phys. 31,592(1953).

$Bi^{212}_{83\ 129}$ α 35.4% ic
β$^-$ 64.6%

P.Marin, G.R.Bishop, H.Halban, Proc. Phys. Soc. 66A, 608 (1953).

$Bi^{214}_{83\ 131}$ γ

0.452	0.932	1.750
0.500	1.123	1.800
0.607	1.236	2.192
0.783	1.400	
0.860	1.525	

sl pe$^-$

R.M.Pearce, K.C.Mann, Can. J. Phys. 31,592(1953).

$Po^{211}_{84\ 127}$ Not parent 0.8^s Pb (< 0.003%) chem

G.Friedlander, E.Wilson, A.Ghiorso, I.Perlman, Phys. Rev. 91, 498A (1953).

$Po^{218}_{84\ 134}$ β$^-$ 0.022% ic

F.Hiessberger, B.Karlik, Sitzber. Akad. Wiss. Wien, Math-naturw. Kl. Abt. II a 161, 51 (1952).

$Ra^{223}_{88\ 135}$ τ 11.1^d Rn^{222}(pile n,γββ) chem

A.P Baerg, Phys. Rev. 90, 1121 (1953).

$Ac^{228}_{89\ 139}$ β$^-$ d Ra^{228} sπ βγ chem

β$^-$	13%	0.45
	8%	0.64
	53%	1.11
	7%	1.70 sπ
	9%	1.85
	10%	2.18

γ sπ ce$^-$

0.0567		
0.078		
0.0978	0.232	0.965
0.113	0.336	1.035
0.1275	0.410	1.095
0.179	0.458	1.587
0.184	0.907	1.640

(0.45β,0.64β) (>1.1γ) (1.11β) (~1γ)
(1.70β,1.85β) (>0.9γ) No (2.18β) (γ)
(0.098 ce^-_L,0.127 ce^-_L, 0.184 ce^-_L) (γ)
No (0.127 ce$^-$) (0.184 ce$^-$) No (>0.9γ) (>0.9γ)
(~0.45γ) (~1.0γ) (~0.9γ) (<0.4γ)
No (~0.45γ) (>1.1γ)

$_{89}Ac^{228}_{139}$ No β(soft e$^-$) delay observed; implies 500$^{\mu s}$>τ(0.057γ)>0.1$^{\mu s}$ or >0.01^s

J.Kyles, C.G.Campbell, W.J.Henderson, Proc. Phys. Soc. 66A, 519 (1953).

$Th^{228}_{90\ 138}$ γ Th^{228} extracted from Ra^{228} scin

100†	(0.083)
14†	0.133
10†	0.172
17†	0.216

Decay products continuously removed

G.Bouissieres, P.Falk-Vairant, M.Riou, J.Teillac, C.Victor, Compt. rend 236, 1874 (1953).

$Th^{230}_{90\ 140}$ γ 9% Th^{230} scin

γ	33†	(0.067)
	4†	0.150
	~0.3†	0.207
	1†	0.254
x	660†	L x ray

†Photons per 10^4 disintegrations

G.Bouissieres, P.Falk-Vairant, M.Riou, J.Teillac, C.Victor, Compt. rend. 236, 1874 (1953).

α ~100% Th^{230} ms ic

~0.03%	4.44
~0.12%	4.47
(25%)	(4.612)
(75%)	(4.682)

(4.47α) (ce$^-$) (4.61α) (ce$^-$)
No (4.44α) (ce$^-$) No (4.68α) (ce$^-$)

G.Valladas, R.Bernas, Compt. rend. 236,2230(1953).

$Th^{234}_{90\ 144}$ β$^-$ Th^{234} + Pa^{234} source sπ√2

β$^-$	33%	0.103
	67%	0.193
γ		0.0294 sπ√2 ce$^-$
		0.0431
		0.0471?
		0.0630
		0.0914 L_I:M_I:N_I = 83:21:5.7
		0.1002

[ce$^-_{L_I}$ (0.091γ)] /β = 0.083
γ's could belong to Pa^{234}

P.H.Stoker, M. Heerschap, O.P.Hok, Physica 19, 433 (1953).

$Pa^{231}_{91\ 140}$ γ (0.027) τ=4.2x10^{-8s} αγ
α_L ~ 7 E1 a

J.Teillac, M. Riou, P. Desneiges, Compt. rend. 237, 41 (1953).

$Pa^{234}_{91\ 143}$ 1.14^m β$^-$ Th^{234}+Pa^{234} source sπ√2

β$^-$	1%	0.580
	9%	1.500
	90%	2.305
γ		0.229 converted in Pa
		0.316
		0.810 α_K~0.06 K/L = 5.2
		0.845
		0.877

No 0.395γ (ce$^-_{LM}$/β$^-$<3x10^{-4})
See Th^{234} for possible γ's

P.H.Stoker, M.Heerschap, O.P.Hok, Physica 19,433 (1953).

NEUTRON CROSS SECTIONS

Reaction	σ Type	Value	Energy	Ref.
H(n)	σ_s	0.332±0.007	th	53h8
	σ_s	0.329±0.004	th	53h7
	σ_t	4.23	1.001	53f4
	σ_t	3.675±0.020	1.311	53f6
	σ_t	0.034	400	53n2
H^2(n,n)	σ_{el}	table	0.135-0.914	53t4
	$d\sigma_{el}/d\Omega$	graphs	0.135-0.914	53t4
	$d\sigma_{el}/d\Omega$	graphs	0.2-2.5	53a2
H^2(n)	σ_t	graph	0.2-3.0	53a2
Be(n)	σ_t	0.232	400	53n2
B(n)	σ_s	753	th	53c10
	Extrapolated value. E_n=0.025 to 0.00068 ev			
	Isotopic composition not given			
C(n,n')	σ(~5-Mev γ's)	0.2	14	53b5
	σ(~5-Mev γ's)	0.09	14	53b5
C(n)	σ_t	graph	0.05-1	53k6
	σ_t	graph	2.2-2.8	53d4
	σ_t	0.298	400	53n2
	σ(spallation)		90	53k5
C^{13}(n,γ)	$\sigma(5700^{y}C)$	≤0.01	th	53b11
O(n,n')	σ(~7-Mev γ's)	0.14	14	53b5
O(n)	σ_t	1.68	14	53a1
	σ_t	0.379	400	53n2
Na(n)	σ_t	graph	2.3-2.8	53d4
Al(n,n')	σ(~2-Mev γ's)	~2	14	53b5
	σ(~6-Mev γ's)	~0.3	14	53b5
Al(n)	σ_t	1.86	14	53a1
	σ_t	0.588	400	53n2
P(n)	σ_t	graph	0.1-0.7	53s4
S(n)	σ_t	0.681	400	53n2
Cl(n)	σ_t	graph	0.1-0.7	53s4
	σ_t	graph	0.15-1	53k6
	σ_t	graph	2.2-2.8	53d4

Neutron Cross Sections - Continued

Reaction	σ Type	Value	Energy	Ref.
Cl(n)	σ_t	0.743	400	53n2
Cl^{35}(n,α)	$\sigma(\alpha)$	graph	3-4	53a4
A^{36}(n,α)	$\sigma(\alpha_0)$*	table	2.1-4.4	53t5
	$\sigma(\alpha_1)$*	table	2.1-4.4	53t5
	* α_0 to g.s. S^{33}; α_1 to 1.1-Mev level S^{33}			
A(n)	σ_t	graph	0.4-1.1	53g4
Ca^{46}(n,γ)	$\sigma(3.4^{d}Sc)$	0.25	th	53c6
Sc(n,n)	σ_s coh	18	0.062	53m7
Sc(n)	σ_t	24	0.062	53m7
Ti(n)	σ_t	graph	2.2-2.8	53d4
Fe(n,n)	σ_s incoh	0.43		53g5
	σ_s free	11.39		53g5
	σ_{el}	2.0	1.0	53w3
	$d\sigma_{el}/d\Omega$	graph	1.0	53w3
Fe(n)	σ_t	1.07	400	53n2
Co^{59}(n,γ)	$\sigma(10.7^{m}Co)$	19	th	53m8
	$\sigma(10.7^{m}Co)$	<0.008	~0.025	53k4
Ni(n,n)	σ_s coh	12.9		53g5
	σ_s free	17.43		53g5
	σ_{el}	2.8	1.0	53w3
	$d\sigma_{el}/d\Omega$	graph	1.0	53w3
Cu(n,n)	σ_{el}	2.9	1.0	53w3
	$d\sigma_{el}/d\Omega$	graph	1.0	53w3
Cu(n)	σ_t	1.19	400	53n2
Cu^{63}(n,γ)	$\sigma(12.9^{h}Cu)$	0.12	~0.025	53k4
Zn(n)	σ_{el}	3.3	1.0	53w3
	$d\sigma_{el}/d\Omega$	graph	1.0	53w3
Ge^{74}(n,γ)	$\sigma(82^{m}Ge)$	0.038	~0.025	53k4
Br(n)	σ_t	graph	2.2-2.8	53d4
Rh(n)	σ_s free	5.5	1.26 ev	53s7
Pd^{102}(n,γ)	$\sigma(17^{d}Pd)$	4.8	pile	53m5
Ag(n,n)	σ_{el}	4.2	1.0	53w3

Neutron Cross Sections - Continued

Reaction	σ Type	Value	Energy	Ref.
Ag(n,n)	$d\sigma_{el}/d\Omega$	graph	1.0	53w3
Cd(n,n)	σ_{el}	5.2	1.0	53w3
	$d\sigma_{el}/d\Omega$	graph	1.0	53w3
Cd(n)	σ_t	1.85	400	53n2
In(n,n)	σ_{el}	6.1	1.0	53w3
	$d\sigma_{el}/d\Omega$	graph	1.0	53w3
Sn(n,n)	σ_{el}	6.0	1.0	53w3
	$d\sigma_{el}/d\Omega$	graph	1.0	53w3
NaI(n)	σ_a	7.4	th	53h7
$Nd^{142}(n)$	σ_a	13	pile	53w4
$Nd^{143}(n)$	σ_a	334	pile	53w4
$Nd^{144}(n)$	σ_a	~0	pile	53w4
$Nd^{145}(n)$	σ_a	37	pile	53w4
$Nd^{146}(n)$	σ_a	~4	pile	53w4
$Nd^{148}(n)$	σ_a	~4	pile	53w4
$Nd^{150}(n)$	σ_a	~0	pile	53w4
Hf(n,n)	σ_a	4.7	1.0	53w3
	$d\sigma_{el}/d\Omega$	graph	1.0	53w3
Au(n)	σ_a	97.5	th	53c10
Extrapolated value assuming 1/v. E_n=0.0035 to 0.00068 ev				
	σ_t	graph	0.1-0.7	53s4
Pb(n,n)	σ_{el}	4.6	1.0	53w3
	$d\sigma_{el}/d\Omega$	graph	1.0	53w3
Pb(n)	σ_t	2.89	400	53n2
Bi(n,n)	σ_{el}	4.8	1.0	53w3
	$d\sigma_{el}/d\Omega$	graph	1.0	53w3
$Rn^{222}(n)$	$\sigma(11.2^d Ra^{223})$	0.7	pile	53b9
Th(n)	σ_t	3.23	400	53n2
U(n)	σ_t	3.26	400	53n2

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GROUND STATE Q'S

Reaction	Standard	Value	Method	Ref.
$H^2(d,n)He^3$		+3.25 ±0.06	ppl	53d5
$H^3(d,n)He^4$		+17.7 ±0.3	ppl	53r3
$He^5 \rightarrow \alpha + n$		+0.95 ±0.07	range	53m6
$Li^6(d,t)Li^5$		+0.9 ±0.1	s	53f5
$Li^6(d,tp)He^4$		+2.51 ±0.04	s	53f5
$Li^6(d,\alpha)He^4$		+22.375±0.014	s	53p2
$Li^7(p,\alpha)He^4$		+17.344±0.013	s	53p2

Ground State Q's - Continued

Reaction	Standard	Value	Method	Ref.
$Li^7(p,n)Be^7$	{Na γ [Mg(p,p')]}	-1.6464 ±0.0009	thresh	53j1
$Li^7(d,\alpha)He^5$		+14.2 ±0.1	ppl	53c8
$Be^9(n,\gamma)Be^{10}$	absolute	+6.816±0.006	pair s	53k7
$B^{10}(d,\alpha)Be^8$		+17.87 ±0.06	s	53c9
$B^{11}(d,p)B^{12}$		+1.140±0.008	s	53e4
$C^{12}(d,p)C^{13}$		+2.722±0.004	s	53p2
$C^{13}(d,\alpha)B^{11}$		+5.166±0.005	s	53p2
$N^{14}(n,\gamma)N^{15}$	absolute	+10.832±0.008	pair s	53k7
$O^{16}(d,\alpha)N^{14}$		+3.119±0.005	s	53p2
$Mg^{24}(n,\gamma)Mg^{25}$	absolute	+7.334±0.007	pair s	53k8
$Mg^{26}(n,\gamma)Mg^{27}$	absolute	+6.440±0.008	pair s	53k8
$Al^{27}(n,\gamma)Al^{28}$	absolute	+7.724±0.006	pair s	53k7
$Si^{28}(\gamma,n)Si^{27}$		-16.9 ±0.2	thresh	53s6
$Si^{28}(n,\gamma)Si^{29}$	absolute	+8.468±0.008	pair s	53k7
$Si^{28}(p,n)P^{28}$	Mg^{24}(p,n)	-15.1 ±0.5	thresh	53g3
$Si^{29}(n,\gamma)Si^{30}$	absolute	+10.601±0.011	pair s	53k7
$S^{32}(p,n)Cl^{32}$	Mg^{24}(p,n)	-13.9 ±0.5	thresh	53g3
$Cl^{35}(n,\alpha)P^{32}$	$Po^{212}\alpha$	+0.97 ±0.16	ic	53a3
$A^{36}(n,\alpha)S^{33}$		+2.0 ±0.1	pc	53t5
$K^{39}(\alpha,p)Ca^{42}$		-0.18	range	53s5
$K^{41}(\alpha,p)Ca^{44}$		+1.20	range	53s5
$Ca^{40}(\gamma,n)Ca^{39}$		-15.8 ±0.1	thresh	53s6
$Ca^{40}(d,p)Ca^{41}$	O^{16}(d,p)	+6.14 ±0.05	ppl	53h9
$Ca^{48}(p,n)Sc^{48}$	{$F^{19}(p,\alpha\gamma)$ $Li^7(p,n)$}	$\geq$-0.64	thresh	53t6
$Ti^{49}(p,n)V^{49}$	{$F^{19}(p,\alpha\gamma)$ $Li^7(p,n)$}	-1.391±0.005	thresh	53t6
$V^{51}(n,\gamma)V^{52}$	{Au, Cs Na γ's}	+7.4	scin	53h8
$Mn^{55}(p,n)Fe^{55}$	{$F^{19}(p,\alpha\gamma)$ $Li^7(p,n)$}	-1.020±0.005	thresh	53t6
$Cu^{63}(\gamma,n)Cu^{62}$	Q value masses	-10.61 ±0.05	thresh	53b7

Ground State Q's - Continued

Reaction	Standard	Value	Method	Ref.
$Zn^{64}(p,n)Ga^{64}$	{$Cu^{63}(p,n)$ $Zn^{66}(p,n)$}	-8.0 ±0.5	thresh	53c7
$Zn^{67}(p,n)Ga^{67}$	{$F^{19}(p,\alpha\gamma)$ Li(p,n)}	-1.785±0.005	thresh	53t6
$Zn^{70}(p,n)Ga^{70}$	"	-1.45 ±0.03	thresh	53t6
$Ga^{71}(p,n)Ge^{71}$	"	-1.03 ±0.03	thresh	53t6
$Ge^{73}(p,n)As^{73}$	"	-1.15 ±0.03	thresh	53t6
$As^{75}(p,n)Se^{75}$	"	-1.652±0.005	thresh	53t6
$Sr^{88}(d,p)Sr^{89}$	O^{16}(d,p)	+4.18 ±0.08	ppl	53h9
$Mo^{100}(\gamma,n)Mo^{99}$		-8.1	thresh	53d6
$Ag^{109}(\gamma,n)Ag^{108}$	Q value masses	-9.07 ±0.07	thresh	53b7
$Ag^{109}(\alpha,2n)In^{111}$		-14.3 ±0.2	thresh	53b12

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